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ABSTRACT

This curriculum guide provides a model for organizing vocational instructional content from which secondary level instructors can extract a construction cluster curriculum that meets local needs. Primarily oriented towards classroom use, this guide may also assist administrators, counselors, and lay people involved in local school systems. Following a discussion of the philosophy and objectives underlying state and local vocational education programs in Georgia, the purpose and objectives of the guide are set forth. Various occupational information pertaining to the construction occupations is provided, including a description of the construction field, employability skills, student exit points, and tasks performed by persons employed in the field. Following a sample curriculum structure and course outline, a series of unit guides is presented. Each of these contains a task statement, a performance objective, instructional activities, suggested instructional materials, and evaluation criteria. The next two sections consist of listings of references and resources and various student record forms. Set forth next are suggestions for working with special needs students. Facility layouts for a learning resource center and a learning laboratory are also included. (MN)

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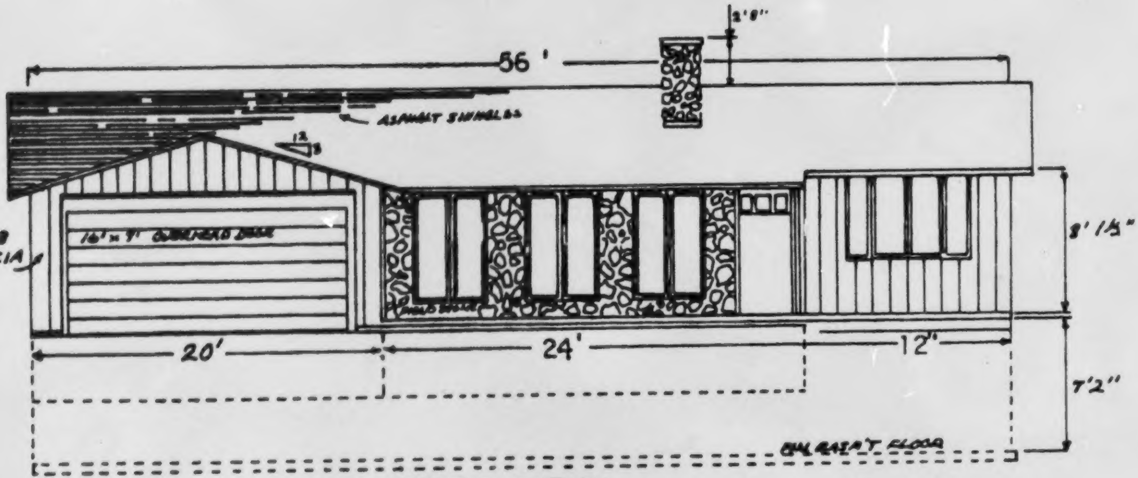
56'
2'8"
ASPHALT SHINGLES
12
3
1x8 FASCIA
16' x 7' OVERHEAD DOOR
8' 1½"
20'
24'
12'
7'2"
BASEMENT FLOOR

FRONT ELEVATION

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CURRICULUM GUIDE

Georgia Department of Education

CONSTRUCTION CLUSTER

Developed Under Contractual Agreement with

Division of Program Development
Office of Vocational Education
Georgia Department of Education
Atlanta, Georgia 30334
Charles McDaniel, State Superintendent of Schools
1981

CONSTRUCTION

Developed By

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POLICIES AND PROCEDURES FOR THE CENTER

PURPOSE OF THE CENTER

The Vocational Education Materials Center functions within the Division of Vocational Education, University of Georgia. This Center operates under grants from the U.S. Office of Education, and the Georgia State Department of Education with the support of the College of Education. The Center is comprehensive in its commitment and approach to the development and dissemination of materials in the broad field of Vocational Education.

The purpose of the Center is to increase the capability of Georgia's delivery system for Vocational Education. Specifically, the Center is committed to:

1. Develop materials to assist in the implementation of proposed curricula and to enhance the teaching of Vocational Education.

2. Conduct and report curriculum research related to Vocational Education.

3. Provide a production and dissemination center for Vocational Education materials.

4. Provide direct experiences in curriculum development and diffusion for advanced graduate students.

5. Enable faculty members to participate in the develoment and implementation of a variety of curriculum materials.

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SECTION I

PHILOSOPHY & GOALS

VOCATIONAL EDUCATION IN GEORGIA

A. PHILOSOPHY

The Georgia Board of Education perceives vocational education as a vital component in the education of the young and adult citizens of this State. Appropriate programs of vocational education and ancillary services should be made readily available to individuals in middle schools, high schools, postsecondary area vocational-technical schools, vocational divisions of junior colleges, vocational centers, the Quick Start program and other adult programs designed to train or retrain workers for useful and satisfying employment.

Special services and assistance must be provided to those who need it in order to participate or benefit from vocational education. This includes women, minorities, the displaced homemaker and other displaced workers, those with limited English-speaking ability, the disadvantaged and the handicapped.

Since men and women spend the greater part of their lives at some form of work, the State should provide opportunities for all its citizens to develop the knowledge, skills and attitudes necessary for them to secure personally satisfying and socially useful employment.

B. PURPOSE

The purpose of vocational education shall be to improve the economic well-being of Georgia citizens by preparing individuals, through organized learning experiences, to select, obtain and advance in recognized occupations.

SECONDARY VOCATIONAL EDUCATION

A. PURPOSE

The purpose of secondary vocational education is to provide training opportunities to middle school students which are of sufficient variety and quality to enable them to make wise career choices, and at the high school level to become familiar with one or more occupations of interest and to specialize in a given occupation to the extent needed to acquire entry-level job skills and knowledge, or to enter more specialized training at the postsecondary level.

B. OBJECTIVES

1. At the middle school level, to provide exploratory PECE and Industrial Arts programs.
2. At the high school level, to provide:
    a. Exploratory and prevocational Industrial Arts programs.
    b. Prevocational programs in occupational clusters for entry into specialized programs in the 11th and 12th grades, or at the postsecondary level.
    c. Training in a single occupational skill of sufficient depth to gain entry-level employability, or the option to continue specialized training at the postsecondary level.
    d. Competency-based programs of occupational preparation which enable students to advance as far as possible through a planned sequence of courses leading to an occupational objective of greatest interest to the student.
    e. Opportunities and activities for students to develop and improve affective skills needed for employment.
    f. Vocational guidance, counseling, remedial and supportive programs and services needed by students to select and complete a program of vocational education.
    g. Ancillary and supportive services necessary to ensure that all students have access to training opportunities regardless of race, sex, national origin, disadvantagement or handicap.
    h. Opportunities for students to obtain or improve Home Economics and Consumer Education skills.
    i. Vocational education programs such that 50% of those individuals who complete or leave a program of occupational preparation, and are available for employment, find employment in the field for which trained, or in a related field.

STATEMENT OF LOCAL SYSTEM PHILOSOPHY, PURPOSE AND GOALS FOR VOCATIONAL EDUCATION

SECTION II

PURPOSE & OBJECTIVES

PURPOSE OF GUIDE

The purpose is defined in terms of the functional needs of each of the identified classes of users in the secondary and post secondary systems.

(a) Vocational teachers.

1. Provide a guide for organizing their program of instruction,
2. Assist in establishing program objectives,
3. Serve as a curriculum materials resource guide,
4. Improve communications with employers and advisory committees,
5. Facilitate competency based instruction,
6. Facilitate either group or self-paced instruction,
7. Include content by quarter and semester,
8. Cross-reference with existing state developed instructional materials (PLACE packages and post secondary I.I.).

(b) Vocational supervisors and administrators.

1. Assist in defining the scope and content of their programs,
2. Provide a means to improve curriculum management functions,
3. Serve as a guide for admissions and job placement functions,
4. Improve communications with employers and advisory committees.

(c) Counseling and guidance staff.

1. Provide a data base for counseling and guidance personnel,
2. Identify student exit points (Carrer Options),
3. Serve as guide for admissions and job placement,
4. Correlate with the new State Board of Education graduation requirements,
5. Provide specific content sequencing by quarter and semester for student scheduling,
6. Provide (a) curriculum options for the disadvantaged handicapped student, (b) curriculum modifications for SPECIAL NEEDS students, (c) typical admission requirements for regular and SPECIAL NEEDS students.

(d) Local Curriculum Coordination Committees.

1. Serve as a guide in working out articulation arrangements,
2. Improve definitions of the relationship between secondary clusters and post secondary specialized programs.

This guide will serve as an ideal communication device between school personnel and the craft advisory committee. By personally reviewing the guide with the local craft advisory committee the teacher will be able to maintain the accuracy of the guide in terms of the local job market and will also be able to inform representatives of local industry regarding the content of the program itself.

CONSTRUCTION PROGRAM OBJECTIVE

The objective of the secondary construction program is to teach job entry skills in each of four occupationally related areas. Specific requirements of each of the areas are based on tasks performed by workers in the construction field and held as essential for initial employment in one or more "exit" points.

Given appropriate instruction as suggested by this guide, a student completing the program should demonstrate entry level skills in carpentry, plumbing, masonry and residential electrical wiring in the areas of knowledge, theoretical structure, tool usage, diagnostic ability, related supportive skills and occupational survival skills.

As the student progresses through the program, sufficient competencies will be acquired to enable the student to enter the occupational field at the following curriculum exit points.

Carpenter Helper	860.664-014
Carpenter II	860.681-010
Rough Carpenter	860.381-042
Roofer	860.381-010
Electrician Helper	829.684-022
Cement Mason Helper	869.687-026
Bricklayer Helper	861.687-010
Stone Mason Helper	869.687-026
Pipe Cutter	862.682-019
Pipe Fitter Helper	862.684-022
Plumbing Assembler Installer	862.684-026

PERFORMANCE STANDARDS REQUIRED FOR GRADUATION

Students are required, by the State Board if Education to demonstrate competency in the adult life roles of the learner, individual, citizen, consumer and producer. The performance standards for the adult life role of the learner will be measured statewide. The local Boards of Education are required to adopt and validate performance indicators for the adult life roles of the individual, citizen, consumer and producer.

Performance Standards (State Board of Education)

A. Learner

1. The student reads and interprets communication on a functional level.
2. The student comprehends information received and applies that information in a variety of everyday situations.
3. The student writes legible appropriate personal and career communications on a functional level.
4. The student receives and transmits oral and visual communication on a functional level.
5. The student employs estimation, approximation and calculation skills in everyday living situations.
6. The student understands and uses various forms of scales and measurements, graphs, charts, tables, symbols and other graphic representations.
7. The student applies basic arithmetic operations (adding, subtracting, multiplying and dividing) in an everyday context.
8. The student applies basic geometric shapes and positions necessary for daily mathematical functions.
9. The student uses a variety of information resources to obtain assistance and information.
10. The student employs logical, intuitive and creative thinking processes.

Performance Standards (Local Board of Education)

B. Individual

1. The student knows appropriate emergency responses to accidents and demonstrates preventive actions for health and safety hazards.

2. The student recognizes and practices sound personal health habits necessary to maintain physical and mental well-being.

3. The student understands the sound health care principles involved in family living, parenting and parenthood.

C. Citizen

1. The student understands the basic structure and functions of the American system of Government and the American economic system.

2. The student knows basic legal rights and responsibilities of the citizen under the American judicial and penal systems.

3. The student recognizes relationships between current societal and environmental problems and the individuals' role and responsibilities.

D. Consumer

1. The student knows the principles of sound personal financial planning and management.

2. The student identifies the legal rights and responsibilities of the consumer in buying and selling goods and services.

E. Producer

1. The student analyzes personal career opportunities and choices through career planning and management.

2. The student demonstrates the skills necessary to obtain employment.

Program Competencies

This program will provide opportunities for the student to demonstrate competencies in the following performance standards. The standards are "keyed" to the above list by letter and number (i.e. A-1, 4, 9; B-3; C-1; etc.).

Performance Standards:

A-1, A-2, A-4, A-5, A-6, A-7, A-9, A-10

B-1

E-1, E-2

SECTION III

D. O. T. DESCRIPTION, EXIT POINTS, TASKS

DESCRIPTION OF OCCUPATIONAL FIELD

The primary purpose of this section is to provide a general orientation to the occupational field. This orientation may be used by counseling and guidance staff in helping students to select subject areas. It may also be used by instructors for new students just entering the program area. The description delimits the scope of the occupational field in terms of the range of activities involved in a series of occupations. It contains information about career potential within the occupational field, including job market conditions and trends.

The description identifies prerequisite skills and knowledge for those students interested in entering the occupational field. In addition, the Description of Occupational Exit Points are provided to aide the instructor in identifying possible jobs for early leavers. A listing of employability skills is also included in this section.

DESCRIPTION OF OCCUPATION

*Construction Occupations

Nature of the Work

The construction field is made up of work in three categories: Structural, Finishing and Mechanical. In general most construction workers fall into one of these categories:

Structural - Carpenter, bricklayer, cement-mason, stonemason, etc.
Finishing - Lather, terrazzo worker, painter, roofer, etc.
Mechanical - Plumber, construction electrician, millwright, etc.

Bricklayers and Stonemasons: From the structural category bricklayers and stonemasons work in closely related trades, each producing attractive, durable surfaces. Bricklayers build walls, partitions, fireplaces and other structures with brick, cinder block and other masonry materials. They also install brick linings in industrial furnaces.

Stonemasons build stone walls as well as set stone exteriors and floors. They work with two types of stone - natural cut and artificial.

In putting up a wall, bricklayers first build the corners at each end of the wall, using plumblines and a level. A line then is stretched from corner to corner as a guide for each course or layer of brick. Bricklayers spread a bed of mortar (cement mixture) with a trowel (a flat metal tool), place the brick on the mortar bed, and then tap it into place. As blueprints specify, they cut bricks with a hammer and chisel to fit around windows, doors and other openings. Mortar joints are finished with jointing tools to leave a neat and uniform appearance. Bricklayers also may use supports at window and door openings.

Stonemasons often work from a set of drawings in which each stone has been numbered for identification. Helpers may locate and bring the prenumbered stones to the masons. A derrick operator using a hoist may be needed to lift large pieces into place.

When building a stone wall, masons set the first layer of stones into a shallow bed of mortar. They align the stones with plumblines and levels, and tap them into position with a wood mallet. Masons build the wall by alternating layers of mortar and stone. As the work progresses, they fill the joints between stones with mortar using a pointed metal tool to smooth the mortar to an attractive finish. To hold stones in place, stonemasons sometimes position pieces of metal within the wall by welding or bolting them together. After positioning the rocks, they cover the metal with mortar. Finally, for a clean appearance, masons wash the stone with a mild acid solution to remove dirt and dry mortar.

Bricklayers, stonemasons and marble setters primarily use handtools-including trowels, brick and stone hammers, wooden or rubber mallets and chisels. For exacting cuts of brick, stone, or marble, they use high-powered electric saws equipped with special cutting blades.

Carpenters: Also from the structural category come the carpentry occupations. Carpentry is commonly divided into two categories - "rough" and "finish". Examples of "rough" carpentry include building house frameworks, scaffolds, and wooden forms for concrete, as well as erecting docks, bridges, and supports for tunnels and sewers. "Finish" carpentry includes building stairs, installing doors, cabinets, wood paneling and molding, and putting up accoustical tiles. In finish carpentry, appearance is just as important as structural integrity. Skilled carpenters do both rough and finish work.

The duties of carpenters vary even within the broad categories of rough and finish carpentry. The type of construction, size of the company, skill of the carpenter, community size, and other factors affect the carpenter's work. A carpenter who is employed by a large contractor, for example, may specialize in laying hardwood floors, while one who is employed by a small contractor may build wall frames, put in insulation, install paneling and even paint. The duties of carpenters also vary because each carpentry job is unique in many ways. Carpenters often have great freedom in planning and performing their work. However, carpentry techniques are standard, and most jobs involve the following steps to some extent.

Working from blueprints, instructions from supervisors, or both, carpenters first do the layout--measure the area and the materials. Local building codes may dictate what materials have to be used for certain jobs and carpenters may have to know these requirements. Wood or other material is cut or shaped with hand and power tools, such as saws and drills. Carpenters then join the materials with nails, screws, or glue. They check the accuracy of their work with levels, rulers and framing squares.

Carpenters not employed in the construction industry usually do installation and maintenance work. For example, school districts employ carpenters to replace glass, ceiling tiles and doors, and to repair desks, cabinets and other furniture. In factories, carpenters may install machinery. All carpenters use handtools such as hammers, saws, chisels, planes and power tools such as powersaws, drills and rivet guns.

Residential Electricians: From the mechanical category of construction are the residential electricians. Electricians follow blueprints and specifications for most installations. To install wiring in factories and offices, they may bend, fit and fasten conduit (pipe or tubing) inside partitions, walls or other concealed areas. Workers also fasten to the wall small metal boxes that will house electrical devices such as switches.

To complete circuits between outlets and switches, they then pull insulated wires or cables through the conduit. They work carefully to avoid damaging any wires or cables. In lighter construction, such as housing, plastic-covered wire usually is used rather than conduit. In any case, electricians connect the wiring to circuit breakers, transformers, or other components. Wires are joined by twisting ends together with pliers and covering the ends together with special plastic connectors. When additional strength is desired, they may use an electric "soldering gun" to melt metal onto the twisted wires, then cover them with durable, electrical tape. When the wiring is finished, they test the circuits for proper connections.

For safety, electricians follow National Electrical Code specifications and procedures and, in addition, must comply with requirements of State, county and municipal electrical codes.

Electricians generally furnish their own tools, including screwdrivers, pliers, knives, and hacksaws. Employers furnish heavier tools, such as pipe threaders, conduit benders, and most test meters and power tools.

Plumbers: Also from the mechanical category are plumbers. In residential plumbing they install water, gas and waste disposal systems in homes, schools, factories and other buildings. Installation techniques for these systems involve pipes, faucets and valves.

Most pipes are steel, copper, cast iron, or some other metal; others may be plastic, glass, or other nonmetallic material. Although some iron pipes come ready to install, most pipes have to be "fitted" for the job. To fit pipes, workers may have to measure, bend, cut and thread pipes; then bolt, braze, solvent weld, screw, or solder them together.

For cutting, workers use a pipecutter. This long-handled tool has a set of rollers and steel-cutting wheels. Workers separate the wheels' edges, set the pipe between them, then tighten the wheels against the pipe. Tightening causes the sharp edges of the wheels to cut just into the pipe's surface on opposite sides. Using the handle for leverage, workers rotate the tool, causing the steel wheels to cut a groove in an exact line around the pipe. To cut entirely through the pipe, workers repeatedly tighten the wheels and rotate the tool around the pipe.

Occasionally workers bend pipes to fit around obstructions. To bend a pipe, workers fasten it securely within a bending device at or near the point of the intended bend, then apply pressure to one end of the pipe.

Workers install and connect pipes and fittings according to the instructions on blueprints or shop drawing. They have to drill holes in ceilings, floors and walls, or hand steel supports from ceilings to position the pipes properly.

After setting the pipes in place, workers connect them. They insert the end of a pipe into the slightly larger end of a valve or properly shaped connector. Workers then may use wrenches to screw threaded pipes tightly together, or may solvent weld, or solder connections to prevent leaks.

Plumbers and pipefitters use wrenches, reamers, drills, braces and bits, hammers, chisels, saws, and other handtools. They use hand-operated hydraulic pipe benders or power machines to cut, bend, and thread pipes. In addition, plumbers and pipefitters use gas or acetylene torches, arc welders, and other welding, soldering, and brazing equipment.

Working Conditions

Bricklayers and Stonemasons: Bricklayers and stonemasons usually work outdoors. They stand, kneel, or stoop for long periods and may have to lift heavy materials to complete a job. They also are subject to injuries from tools and falls from scaffolds. Despite the physical demands and general hazards of construction, however, these workers are less likely to be injured than other construction workers.

Carpenters: As in other building trades, the carpenter's work is active and sometimes strenuous. Prolonged standing, climbing, and squatting often are necessary. Carpenters risk injury from slips or falls, from contact with a sharp or rough materials, and from the use of sharp tools and power equipment. Many carpenters work outdoors.

Some carpenters change employers each time they finish a construction job. Others alternate between wage employment for contractors and self-employment on small jobs.

Electricians: Electricians are not required to have great physical strength, but they frequently must stand for long periods and work in cramped quarters. Because much of their work is indoors, electricians are less exposed to unfavorable weather than are most other construction workers. They risk electrical shocks, falls from ladders and scaffolds, and blows from falling objects. However, safety practices have reduced the injury rate.

Plumbers: Plumbing is sometimes strenuous. These workers frequently must stand for long periods and occasionally work in cramped or uncomfortable positions. They risk the danger of falls from ladders, cuts from sharp tools, and burns from hot pipes. The injury rate for employees of plumbing, heating, and air-conditioning contractors has been higher than the average for employees of manufacturing firms. However, most injuries in the trade are not severe.

Places of Employment

Bricklayers and Stonemasons: About 204,000 bricklayers, stonemasons and other types of masons were employed in 1978; most were bricklayers. Workers in these crafts were employed primarily by special trade, building, or general contractors. A relatively small number of bricklayers work for government agencies or businesses that do their own construction and alteration.

Workers in these trades are employed throughout the country, but are concentrated in metropolitan areas. In cities that are too small to have demand for full-time stonemasons or marble setters, bricklayers will install stone or marble as a sideline.

About 1 out of 4 bricklayers, stonemasons, and marble setters is self-employed--a proportion higher than that in most building crafts. Many of the self-employed specialize in contracting on small jobs such as patios, walks, and fireplaces.

Carpenters: In 1978 about 1,253,000 carpenters were employed of whom nearly one out of four were self-employed. Most carpenters work for contractors and homebuilders who construct, remodel, or repair buildings and other structures. Some do construction and maintenance for government agencies, utility companies, manufacturing firms, or other large organizations.

Carpenters work throughout the country and, because of their versatility, are much less concentrated geographically than any other construction occupation.

Electricians: Most of the 270,000 construction electricians employed in 1978 worked for electrical contractors. Many others were self-employed contractors. Construction electricians are employed throughout the country, but are concentrated in industrialized and urban areas.

Plumbers: Most plumbers and pipefitters--who numbered about 428,000 in 1978--work for plumbing and pipefitting contractors engaged in new construction or repair, alteration, or modernization work. A substantial proportion of plumbers are self-employed. Some plumbers install and maintain pipe systems for government agencies and public utilities, and some work on the construction of ships and aircraft. Others do maintenance work in industrial and commercial buildings. Pipefitters, in particular, are employed as maintenance personnel in the petroleum, chemical, food-processing industries where manufacturing operations require the moving of liquids and gases through pipes.

Training, Other Qualifications, and Advancement

High school vocational education courses provide a solid grounding which serves as a springboard into work situations which then provide on-the-job experience and growth. Additional training for these new employees can come in the form of apprenticeships which are described below.

Bricklayers and Stonemasons: Many bricklayers as well as some stonemasons and other masons pick up their skills informally by working as helpers or hod carriers and by observing and learning from experienced workers. The remainder learn their skills through apprenticeships.

Individuals who learn the trade informally become bricklayers. They start with carrying materials, moving scaffolds, and mixing mortar. However, it takes several months to a year before they are taught to spread mortar and lay brick. They begin with simple patterns and progress to more complex designs. Learning to set stone or marble might take several years.

Apprenticeships for bricklayers, stonemasons, and other masons usually are sponsored by local contractors or by local union-management committees. The apprenticeship program requires 3 years of on-the-job training, in addition to 144 hours of classroom instruction each year in subjects such as blueprint reading, mathematics, layout work, and sketching. Apprentices learn the general applications of brick, stone, and marble.

Apprentices start by carrying materials and mixing mortar. Within 2 or 3 months, they learn to aline, lay, and clean brick. Apprentices eventually learn to work with stone and marble. After apprenticeship, they usually specialize on one of the three trades.

Applicants for apprenticeships must be at least 17 years old. Apprentice and helper applicants should be in good physical condition. A high school or vocational education is preferable, as are courses in mathematics, mechanical drawing, and shop.

Experienced workers can advance to supervisory positions or become estimators. They also can open contracting businesses of their own.

Carpenters: Some training authorities recommend the completion of an apprenticeship as the best way to learn carpentry. A large number of workers in this trade, however, have acquired their skills informally (for example, by working as carpenters' helpers).

The apprenticeship programs, administered by local contractors' associations or by joint committees of contractors and unions, consist of 4 years of on-the-job training and a minimum of 144 hours of related classroom instruction each year. Apprenticeship applicants generally must be 17 years old and meet local requirements. For example, some locals give tests designed to measure an applicant's aptitude for carpentry.

On the job, apprentices learn elementary structural design and become familiar with common carpentry jobs such as form building, rough framing, and outside and inside finishing. They also learn to use the tools, machines, equipment, and materials of the trade. Apprentices receive classroom instruction in safety, first aid, blueprint reading and freehand sketching, basic mathematics, and different carpentry techniques. Both in the classroom and on the job, they learn the relationship between carpentry and the other building trades.

Informal on-the-job training provided by employers usually is less thorough than apprenticeships. The degree of training and supervision in these programs often depends on the size of the employing firm. A small contractor who specializes in homebuilding may provide training in only one area--for example, rough framing. In contrast, a large general contractor may provide training in several carpentry skills.

A high school or vocational education is desirable, as are courses in carpentry, shop, mechanical drawing, and general mathematics. Manual dexterity, good physical condition, a good sense of balance, and lack of fear of working on high structures are important. The ability to solve arithmetic problems quickly and accurately and to work closely with others is helpful.

Carpenters may advance to supervisors or general construction supervisors. Some carpenters become contractors. Carpenters usually have greater opportunities than most other construction workers to become general construction supervisors or contractors because they learn more about the entire construction process in their work.

Electricians: Some authorities recommend the completion of a 4-year apprenticeship program as the best way to learn the electrical trade. Compared to most other construction trades, electricians have a higher percentage of apprentice-trained workers. Although many people learn the trade informally by working for several years as electricians' helpers, this method of training is declining in relative importance. Many helpers gain additional knowledge through trade school or correspondence courses, or through special training in the Armed Forces.

Apprenticeship programs are sponsored through and supervised by local union-management committees or company management committees. While the programs are separate, the content, amount of training, and method of instruction are nearly identical. These programs provide 144 hours of classroom instruction each year in addition to comprehensive on-the-job training. In the classroom, apprentices learn blueprint reading, electrical theory, electronics, mathematics, and safety and firstaid practices. On the job, under the supervision of experienced electricians, apprentices must demonstrate mastery of electrical principles. At first, apprentices drill holes, set anchors, and set up conduit. In time and with experience, they measure, bend, and install conduit, as well as install, connect, and test wiring. They also learn to set up and draw diagrams for entire electrical systems.

Beginners who are not apprentices can pick up the trade informally in a variety of ways. For example, some begin work in manufacturing plants by piecing together electrical components. Others start in maintenance where they learn about circuit breakers, fuses, switches, and other electrical devices. Later, they broaden their knowledge by working as helpers for experienced electricians. While learning to install conduit, connect wires, and test circuits, helpers are also taught good safety practices.

All applicants should be in good health and have at least average physical strength. Good color vision is important because workers frequently must identify electrical wires by color. Also important are agility and dexterity. Applicants for apprentice positions must be at least 18 years old and usually must be a high school or vocational school graduate with 1 year of algebra. Courses in electricity, electronics, mechanical drawing, science, and shop provide a good background.

To obtain a license, necessary for employment in some cities, an electrician must pass an examination which requires a thorough knowledge of the craft and of State and local building codes.

Experienced construction electricians can advance to supervisors, superintendents, or contract estimators for contractors on construction jobs. Many electricians start their own contracting businesses. In most large urban areas, a contractor must have an electrical contractor's license.

Plumbers: Apprenticeship is one recommended way for plumbers to learn all aspects of the trade. A large number of people, however, learn plumbing by working for several years as helpers to experienced plumbers and pipefitters, and observing and receiving instruction from them.

Most apprenticeship programs for plumbers are sponsored through union-management agreements and usually consist of 4 years of on-the-job training, in addition to at least 216 hours annually of related classroom instruction. Subjects include drafting and blueprint reading, mathematics applicable to layout work, applied physics and chemistry, and local plumbing codes and regulations.

On the job, helpers and apprentices begin with simple tasks such as carrying materials and cleaning up debris. In a short time they learn to measure and cut pipe, and later to bend, thread, and connect it. Welding, the most difficult form of connecting pipe, is taught toward the end of training. In the final phase of training, helpers and apprentices may learn to estimate costs.

Applicants for apprentice or helper jobs generally are required to be at least 18 years old and in good physical condition. A high school or vocational school education generally is recommended. Courses in chemistry, general mathematics, mechanical drawing, physics, and shop are helpful. Applicants may be given tests to determine whether they have the mechanical aptitude required in these trades. To obtain a plumber's license, which some communities require, individuals must pass a special examination to demonstrate knowledge of the trade and of local plumbing codes.

Some plumbers may become supervisors for plumbing contractors. Many go into business for themselves. As they expand their activities, they may employ other workers and become contractors. In most localities, contractors are required to obtain a master plumber's license.

Employment Outlook

Bricklayers and Stonemasons: Employment of bricklayers is expected to grow more slowly than the average for all occupations through the 1980's. Although few job openings will result from growth in the demand for these workers, many openings will arise as experienced bricklayers retire, die, or leave the occupation for other reasons. Almost all new employees will be hired as bricklayers.

While population and business growth create a need for new homes, factories, offices, and other structures, the demand for bricklayers will grow. Stimulating this growth will be increasing use of brick for decorative work on building fronts and in lobbies and foyers. The use of brick, particularly for interior load-bearing walls and prefabricated brick panels, is growing and will add to overall employment needs. However, the substitution of cement or other less expensive materials for brick will moderate employment growth.

The number of job openings for bricklayers may fluctuate from year to year because employment in this trade is sensitive to ups and downs in construction activity. For any given year, however, opportunities are best during the spring and summer when construction activity picks up.

Carpenters: Job opportunities for carpenters should be plentiful over the long run. Because of the large number of people employed in this field, replacement needs are high. Besides the job openings that result from the need to replace carpenters who retire, die, or leave their job for other reasons, openings will be created by employment growth.

Most of the growth in carpenter employment will occur during the early 1980's. Most carpenters work in the construction activity. Through the mid 1980's, growth in the number of households and business expansion will stimulate construction activity, especially for new houses. As the number of households grows more slowly through the late 1980's the level of construction activity and the growth of carpenter employment will slow down.

Because construction activity is sensitive to ups and downs in the economy, the number of job openings may fluctuate greatly from year to year. Carpenters with all-round training will be in much greater demand and will have better opportunities for advancement than those who can do only relatively simple, routine types of carpentry.

Electricians: Employment of electricians is expected to increase about as fast as the average for all occupations through the 1980's. As population and the economy grow, more electricians will be needed to install electrical fixtures and wiring in new and renovated homes, offices and other buildings. In addition to jobs created by increased demand for electrical work, many openings will arise as experienced electricians retire, die, or leave the occupation for other reasons. Opportunities will be best for persons with apprenticeship training.

Although employment in this field is expected to grow over the long run, it may fluctuate from year to year due to ups and downs in construction activity. When construction jobs are not available, however, electricians may transfer to other types of electrical work. For example, they may find jobs as maintenance electricians in factories or as electricians in shipbuilding or aircraft manufacturing.

Plumbers: Employment of plumbers is expected to grow as fast as the average for all occupations through the 1980's. Thousands of job openings are expected because of employment growth and the need to replace plumbers who retire, die, or stop working for other reasons.

Employment is expected to grow mainly as a result of anticipated increases in construction. Furthermore, plumbing will become more important in many types of construction. For example, a larger proportion of homes will have air-conditioning, solar heating, and appliances such as kitchen waste-disposals. Chemical and petroleum refineries and coal gasification and nuclear power plants, which use pipe extensively in processing, are expected to expand and create additional jobs for plumbers. Maintenance, repair, and modernization of existing plumbing or piping systems also will create employment opportunities.

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*From Occupational Outlook Handbook, 1980 ed.

Sources of Additional Information

International Union of Bricklayers and Allied Craftsmen,
International Masonry Apprenticeship Trust, 815 15th
St NW., Washington, D.C. 20005

Associated General Contractors of America, Inc., 1957 E St.
NW., Washington, D.C. 20006

Brick Institute of America, 1750 Old Meadow Rd., McLean,
Va. 22101

United Brotherhood of Carpenters and Joiners of America,
101 Constitution Ave. NW., Washington, D.C. 20005

Associated Builders and Contractors, Inc., 444 N. Capitol
St. NW., Suite 409, Washington, D.C. 20001

Associated General Contractors of America, Inc., 1975 E
St. NW., Washington, D.C. 20006

National Association of Home Builders, Manpower Development
and Training Department, 15th and M St. NW., Washington,
D.C. 20005

Associated Independent Electrical Contractors of America,
1201 N. Watson Rd., Suite 201, Arlington, Texas 70611

International Brotherhood of Electrical Workers, 1125 15th
St. NW., Washington, D.C. 20005

National Association of Lighting Maintenance Contractors
1750 Old Meadow Rd., Suite 3-A, McLean, VA 22102

National Electrical Contractors Association, 7315 Wisconsin
Ave, NW., Washington, D.C. 20014

National Joint Apprenticeship and Training Committee for the
Electrical Industry, 9700 E. George Palmer Hwy., Lanham,
Md. 20802

National Association of Plumbing-Heating-Cooling Contractors,
1016 20th St. NW., Washington, D.C. 20036

National Automatic Sprinkler and Fire Control Association,
P.O. Box 719, Mt. Kisco, N.Y. 10549

*Related Occupations

860.681-010 CARPENTER

Assembles prefabricated building wall panels, using handtools and power tools. Reads blueprints to determine type of wall panel required. Selects precut studs, measures top and bottom leaders, and marks studs and leader locations, using tape measure. Lays materials on worktable according to markings to fabricate wall frame. Alines sheetrock on frame. Locates, marks, and cuts receptacle openings in sheetrock, using tape measure, template, and handsaw. Reads specification sheet to determine types of windows and siding required on outside of wall panel. Selects and installs prefabricated windows in prepared openings, using hammer and nails. Measures, marks, cuts, and fastens siding and molding to form outside wall of panel, using tape measure and handtools. Moves completed panel to shipping area, using electric hoist. May direct workers in fastening studs and sheetrock. May operate nailing and routing machines to assemble wall panels and components.

860.381-042 CARPENTER, ROUGH

Builds rough wooden structures, such as concrete forms, scaffolds, tunnel and sewer supports, and temporary frame shelters, according to sketches, blueprints, or oral instructions. Examines specifications to determine dimensions of structure. Measures boards, timbers, or plywood, using square, measuring tape, and ruler, and marks cutting lines on materials, using pencil and scriber. Saws boards and plywood panels to required sizes. Nails cleats (braces) across boards to construct concrete-supporting forms. Braces forms in place with timbers, tie rods, and anchor bolts, for use in building concrete piers, footings, and walls. Erects chutes for pouring concrete. Cuts and assembles timbers to build trestles and cofferdams. Builds falsework to temporarily strengthen, protect, or disguise buildings undergoing construction. Erects scaffolding for buildings and ship structures and installs ladders, handrails, walkways, platforms, and gangways. Installs door and window bucks (rough frames in which finished frames are inserted) in designated position in building framework, and braces them with boards nailed to framework. Installs subflooring in buildings. Nails plaster grounds (wood or metal strips) to studding to provide guide for PLASTERER (const.). Fits and nails sheating (first covering of boards) on outer walls and roofs of buildinds. Builds sleds from logs and timbers for use in hauling camp buildings and machinery through wooded areas.

829.684-022 ELECTRICIAN HELPER

Assists ELECTRICIAN to install and repair electrical wiring, fixtures, and equipment, performing any combination of following tasks. Measures, cuts, and bends wire and conduit, using ruler and handtools. Drills holes for wiring, using power drill, and pulls or pushes wiring through opening. Assists in lifting, positioning, and fastening objects, such as wiring, conduit, and motors. Performs minor repairs, such as replacing fuses, light sockets, bulbs, and switches, using handtools. Maintains tools and equipment and keeps supplies and parts in order. Disassembles defective electrical equipment, such as motors, using handtools. Performs other duties as described under HELPER (any ind.).

860.664-014	CARPENTER HELPER
869.687-026	CEMENT MASON HELPER
861.687-010	BRICKLAYER HELPER
869.687-026	STONE MASON HELPER
862.684-022	PIPE FITTER HELPER

Performs any combination of following tasks, such as erecting, repairing, and wrecking buildings and bridges, installing waterworks, locks, and dams, grading and maintaining railroad right-of-ways and laying ties and rails, and widening, deepening, and improving rivers, canals, and harbors, requiring little or no independent judgment. Digs, spreads, and levels dirt and gravel, using pick and shovel. Lifts, carries, and holds building materials, tools, and supplies. Cleans tools, equipment, materials, and work areas. Mixes, pours, and spreads concrete, asphalt, gravel, and other materials, using handtools. Joins, wraps, and seals sections of pipe. Performs a variety of routine, non-machine tasks, such as removing forms from set concrete, filling expansion joints with asphalt, placing culvert sections in trench, assembling sections of dredge pipeline, removing wallpaper, and laying railroad track. Many of these jobs are not full time, the size of the project and organization of the work determining whether a worker spends all his time on one job or is transferred from task to task as the project progresses to completion. Some workers habitually work in one branch of the industry, whereas others transfer according to the availability of work or on a seasonal basis.

862.682-010 PIPE CUTTER

Operates machine to cut, thread, and ream pipes, and assembles pipes, according to blueprints, to form mobile home water system, using handtools. Measures and marks pipes to be cut and threaded, using tape measure and pencil. Positions and secures pipe in chuck of machine. Starts machine and turns handwheel to engage pipe with dies that cut threads. Pulls lever to lubricate pipes and dies, and turns handwheel to activate reaming tool to burn inside of pipe. Moves lever to open dies, and turns handwheel to disengage dies from pipe. Repositions pipe in chuck and alines cutting wheels with mark on pipe. Starts machine and turns handle to apply pressure on cutting wheels. Applies sealing compound to threads and fittings with brush and joins pipes in sequence specified, according to blueprints, to form water system, using wrench and vise.

862.684-026 PLUMBING ASSEMBLER-INSTALLER

Assembles and installs manufactured building bathroom hardware, fixtures, and plumbing, under direction of PLUMBER. Cuts copper tubing according to written instruction using powersaw. Connects, solders, and squares pipes, using solder paste or solder and torch, vice, and level. Selects preassembled wall plumbing units, such as risers, air chamber, and valves, according to diagram. Fastens units to studs with metal braces, using hammer and nails. Selects, assembles, and installs fixtures, such as tab, sink, toilet, and shower fixtures, using handtools. Applies glue to vanity and sets vanity in place.

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*From D. O. T.

EMPLOYABILITY SKILLS

In addition to the aptitudes, abilities, interests, physical requirements and job skills listed in the preceding Description of Occupation, employability skills exert a great deal of influence on a person's ability to get and keep a job. Surveys indicate that more people lose their jobs because of poor attitudes toward their job than for lack of job skills. For this reason it is important that information concerning the following employability skills be provided as an ongoing part of the program.

1. Getting a job
    a. Filling out job applications
    b. Developing a resume
    c. Preparing for a job interview

2. Keeping a job
    a. Be on time and regular in attendance
    b. Maintain a fair share of the work-load
    c. Work without supervision
    d. Meet production schedules
    e. Properly care for and use equipment
    f. Dress appropriately for the job
    g. Maintain good personal hygiene
    h. Develop and maintain good communication with supervisors and co-workers

EXIT POINTS

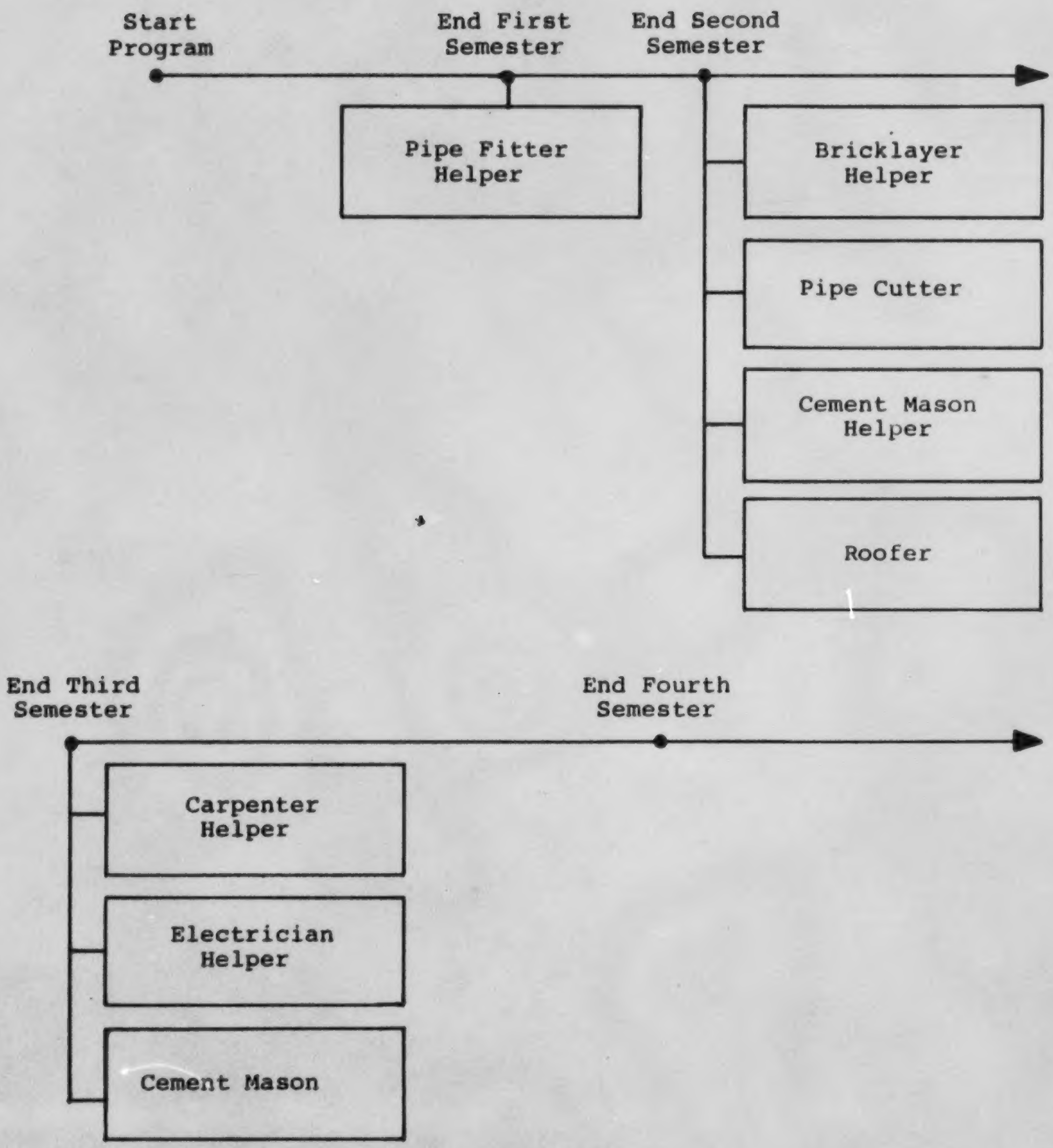
The diagram on the following page is based on the suggested course outline structure. It graphically illustrates the points in the construction program where the student should have acquired the competencies necessary for entry level employment into the job classification indicated. In many cases by the time the student reaches an exit point he/she may have acquired several competencies in addition to those required for the specific job classification.

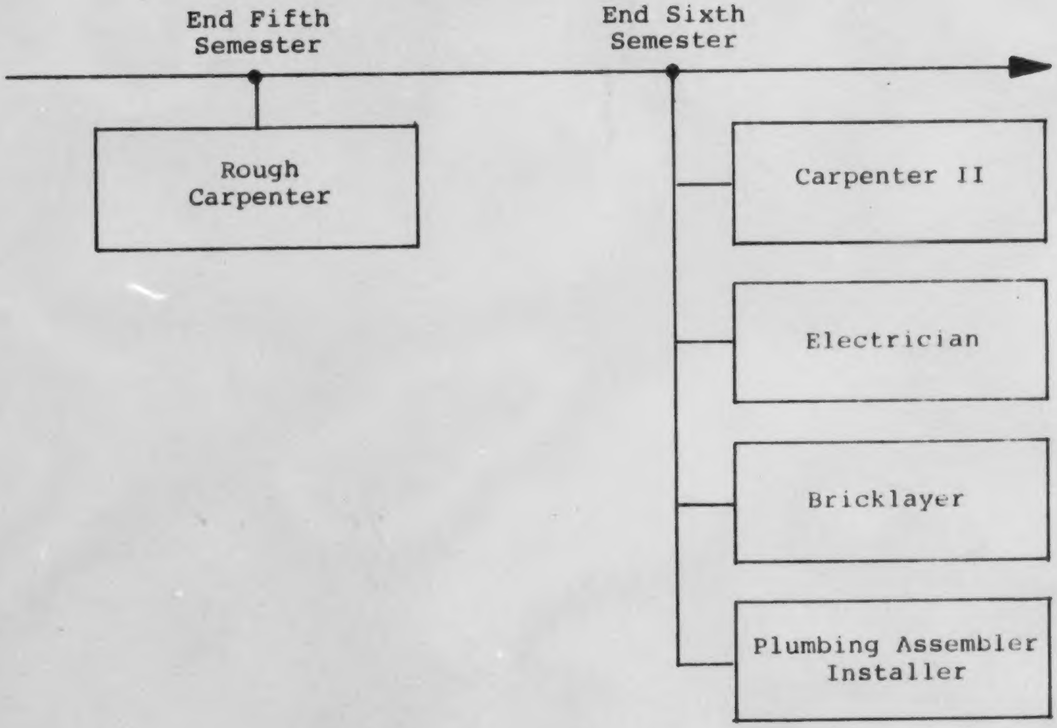
The course outline is structured to prepare students to become workers in the construction field, therefore, an introduction to or preparation in carpentry, plumbing, masonry and electrical wiring is given. Every student, upon leaving the construction program, should have entry level skills, in an occupation related to the field.

The task listing by D.O.T. Code indicates the entry level skills (tasks) required for the student to be considered employable in a specified occupation. If the local program is individualized it should be relatively easy to move a potential program leaver (drop out) into those skills (tasks) which would qualify the student for one of the listed occupations. This means an instructor will be able to tailor a program to fit a student's needs. A student can, if necessary, bypass all task activities which are not related specifically to a D.O.T. description. However, students who are taught in a traditional large group instructional sequence will be locked-in-step with all other students and will not have the flexibility to specialize in one occupational title.

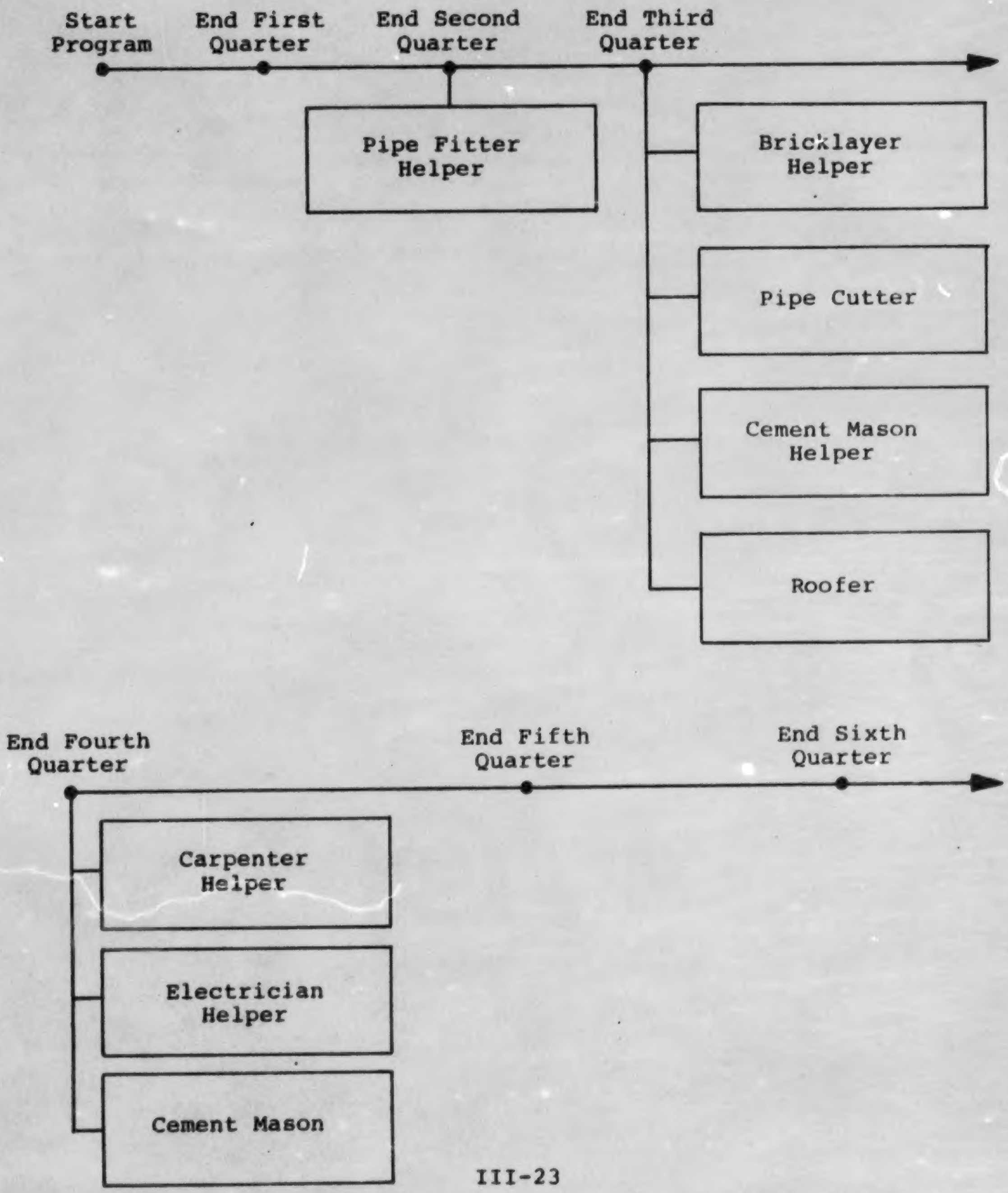
Two diagrams are presented. The first assumes the student will rotate through all areas of the construction cluster then begin to narrow the scope of training in order to specialize in one area. This exit point diagram represents the most frequently utilized curriculum structure. The second diagram assumes the student has specialized in an occupational area for a nine quarter (three year) period. It is presented not as a suggested method for structuring the curriculum, but rather as timeline information for instructors who have students wishing to specialize or potential dropouts who need specific skills to qualify for a job upon leaving school.

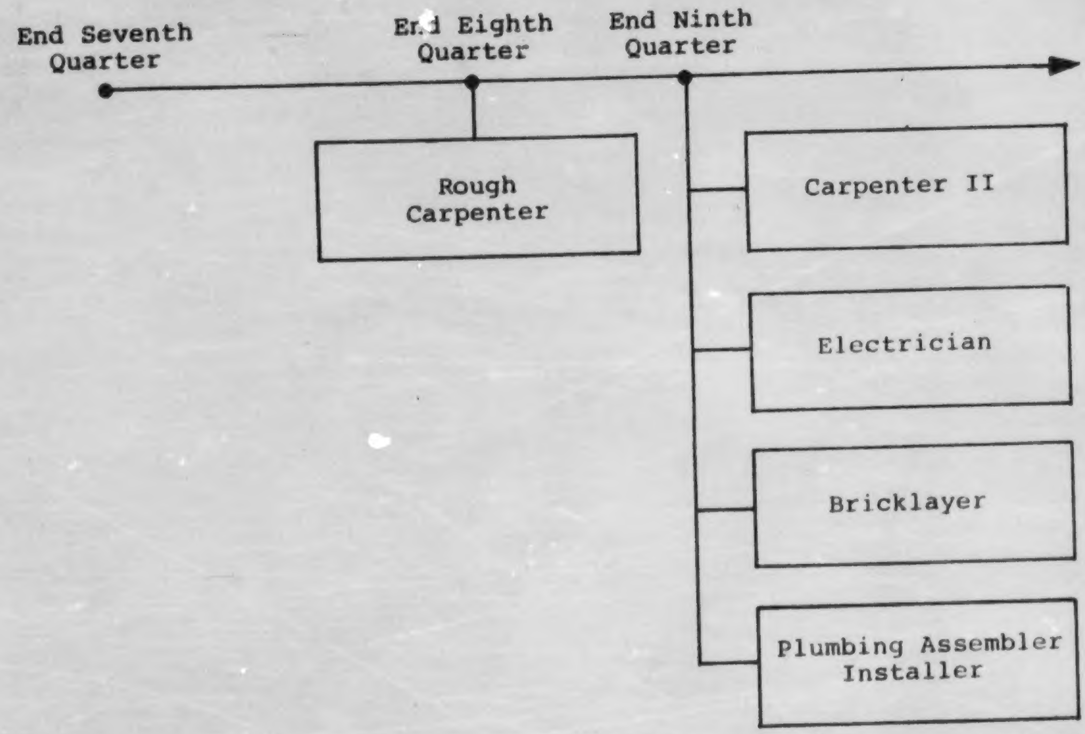
ALTERNATIVE FOR SINGLE SKILL SPECIALIZATION USING A SEMESTER APPROACH


Start Program
End First Semester
End Second Semester
Pipe Fitter Helper
Bricklayer Helper
Pipe Cutter
Cement Mason Helper
Roofer
End Third Semester
End Fourth Semester
Carpenter Helper
Electrician Helper
Cement Mason

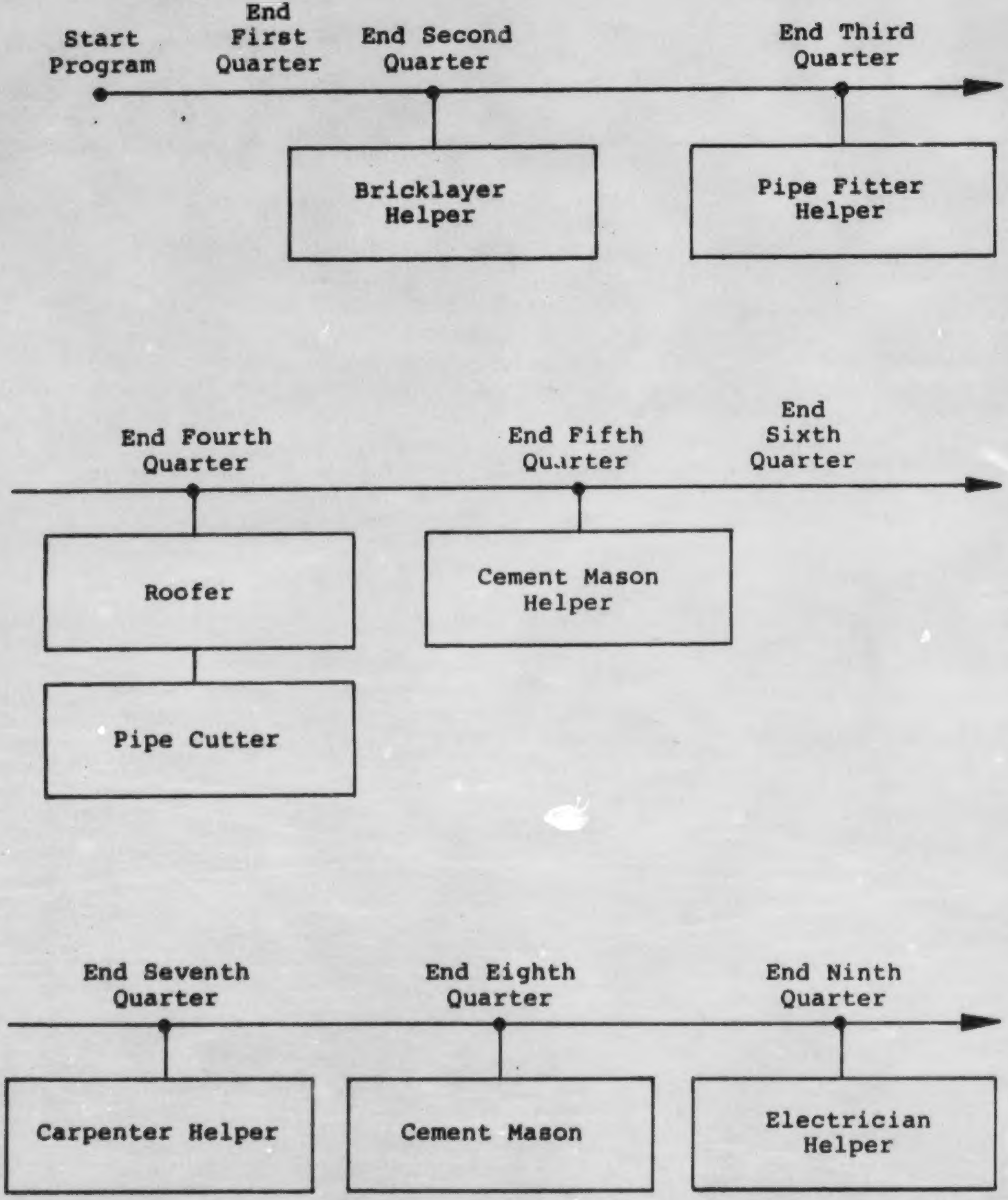

End Fifth Semester
End Sixth Semester
Rough Carpenter
Carpenter II
Electrician
Bricklayer
Plumbing Assembler Installer

ALTERNATIVE FOR SINGLE SKILL SPECIALIZATION USING A QUARTER APPROACH


Start Program
End First Quarter
End Second Quarter
End Third Quarter
Pipe Fitter Helper
Bricklayer Helper
Pipe Cutter
Cement Mason Helper
Roofer
End Fourth Quarter
End Fifth Quarter
End Sixth Quarter
Carpenter Helper
Electrician Helper
Cement Mason


End Seventh Quarter
End Eighth Quarter
End Ninth Quarter
Rough Carpenter
Carpenter II
Electrician
Bricklayer
Plumbing Assembler Installer

ALTERNATIVE FOR TRADITIONAL CLUSTER APPROACH


Start Program
End First Quarter
End Second Quarter
End Third Quarter
Bricklayer Helper
Pipe Fitter Helper
End Fourth Quarter
End Fifth Quarter
End Sixth Quarter
Roofer
Pipe Cutter
Cement Mason Helper
End Seventh Quarter
End Eighth Quarter
End Ninth Quarter
Carpenter Helper
Cement Mason
Electrician Helper

TASK LISTING BY D.O.T. CODE

The tasks are listed in this section in a matrix format that cross references them with the applicable D.O.T. codes for the exit point occupational titles. Each task is identified with one or more of the exit point occupational titles. This information may be used to make a specific determination as to when a student has developed the necessary skills to qualify for an exit point. This information is particularly useful in preparing early leavers to meet the requirements for a specific occupational title.

Instructors should note that the task listing has gone beyond what would normally be expected from a student on the secondary level. The task lists and corresponding unit guides are more comprehensive so that instructors will have additional information readily available for students who wish to specialize in one of the four occupational areas covered in the construction program.

TASK LISTING BY DOT CODE

MASONRY

POSSIBLE EXIT POINTS

	DOT DESCRIPTIONS	Cement Mason Helper	Bricklayer Helper	Stone Mason Helper	Cement Mason	Stone Mason	Bricklayer Construction
	DOT NO.	869.687-026	861.687-010	869.687-026	844.364-010	861.381-038	861.381-018
TASK NO.	TASK NAME						
	DUTY I - Performing Basic Bricklaying Manipulations						
M-01	Spreading mortar	X	X	X	X	X	X
M-02	Laying brick to a line		X				X
M-03	Building a brick corner						X
M-04	Cutting brick and block		X	X		X	X
	DUTY II - Using a Brick Spacing Rule						
M-05	Determing spacing for standard sized brick						X
M-06	Laying out courses to sill and cornice height						X
M-07	Interpreting and using a line modular rule		X	X		X	X
	DUTY III - Using Working Drawings						

TASK LISTING BY DOT CODE

MASONRY

POSSIBLE EXIT POINTS

TASK NO.	TASK NAME	Cement Mason Helper	Bricklayer Helper	Stone Mason Helper	Cement Mason	Stone Mason	Bricklayer Construction
	DOT NO.	869.687-026	861.687-010	869.687-026	844.364-010	861.381-038	861.381-018
M-08	Dimensioning and scaling a working drawing						X
M-09	Identifying names and uses of lines and symbols on a working drawing						X
M-10	Identifying different views and their uses on a working drawing						X
	DUTY IV - Preparing Footings and Foundations						
M-11	Setting batter boards	X	X		X		X
M-12	Inspecting grading at building site				X	X	X
M-13	Finishing grading at building site	X	X	X	X	X	X
M-14	Setting frames for footing/foundations	X			X		X
M-15	Installing steel reinforcing	X	X	X	X	X	X
M-16	Operating a transit				X		X
M-17	Pouring footing	X			X		X

TASK LISTING BY DOT CODE

MASONRY

POSSIBLE EXIT POINTS

TASK NO.	TASK NAME	Cement Mason Helper	Bricklayer Helper	Stone Mason Helper	Cement Mason	Stone Mason	Bricklayer Construction
	DOT NO.	869.687-026	861.687-010	869.687-026	844.364-010	861.381-038	861.381-018
	DUTY V - Building Double Brick Walls						
M-18	Laying an eight inch wall with header						X
M-19	Building an L-shaped eight inch wall with header coursed, header caps and rowlocks						X
M-20	Constructing cavity walls						X
	DUTY VI - Building Block Corners						
M-21	Laying a four inch block corner in running bond						X
M-22	Laying an eight inch block corner in running bond						X
M-23	Building a six inch block corner in running bond						X

TASK LISTING BY DOT CODE

MASONRY

POSSIBLE EXIT POINTS

TASK NO.	TASK NAME	Cement Mason Helper 869.687-026	Bricklayer Helper 861.687-010	Stone Mason Helper 869.687-026	Cement Mason 844.364-010	Stone Mason 861.381-038	Bricklayer Construction 861.381-018
	DOT DESCRIPTIONS / DOT NO.						
M-24	Building a twelve inch block corner in running ½ bond						X
M-25	Laying a block corner in stacked bond						X
	DUTY VII - Laying Brick Bonds						
M-26	Building an English corner						X
M-27	Building a Dutch corner						X
M-28	Laying a Flemish bond						X
M-29	Laying an English bond						X
	DUTY VIII - Laying Concrete Slabs						
M-30	Making and testing concrete	X			X		X
M-31	Finishing concrete	X			X		X
M-32	Estimating concrete				X		X

TASK LISTING BY DOT CODE

MASONRY

POSSIBLE EXIT POINTS

	DOT DESCRIPTIONS	Cement Mason Helper	Bricklayer Helper	Stone Mason Helper	Cement Mason	Stone Mason	Bricklayer Construction
	DOT NO.	869.687-026	861.687-010	869.687-026	844.364-010	861.381-038	861.381-018
TASK NO.	TASK NAME						
	DUTY IX - Mixing and Finishing						
	Terrazzo						
M-33	Mixing and finishing terrazzo				X		X
	DUTY X - Estimating Masonry						
	Materials						
M-34	Estimating masonry materials						X
	DUTY XI - Constructing Buildings						
M-35	Setting corner poles						X
M-36	Laying reinforced brick masonry						X
M-37	Setting lintels	X	X			X	X
M-38	Making reinforced lintels						X
M-39	Setting door frames						X
M-40	Using anchors to tie doors to walls						X
M-41	Setting window frames		X				X

TASK LISTING BY DOT CODE

MASONRY

POSSIBLE EXIT POINTS

TASK NO.	TASK NAME	Cement Mason Helper 869.687-026	Bricklayer Helper 861.687-010	Stone Mason Helper 869.687-026	Cement Mason 844.364-010	Stone Mason 861.381-038	Bricklayer Construction 861.381-018
	DOT DESCRIPTIONS / DOT NO.						
M-42	Laying soldier courses						X
M-43	Laying rowlock sills						X
M-44	Placing expansion joints						X
M-45	Building brick steps						X
M-46	Constructing glazed fire walls						X
M-47	Laying structural clay tile						X
M-48	Waterproofing walls	X	X		X		X
M-49	Setting stone			X		X	X
M-50	Cleaning brickwork		X				X
	DUTY XI - Constructing Chimneys and Fireplaces						
M-51	Building rough fireplace and ash pit						X
M-52	Setting clean-out door						X
M-53	Forming firebox						X
M-54	Setting ash dump						X
M-55	Assembling and setting damper						X

TASK LISTING BY DOT CODE

MASONRY

POSSIBLE EXIT POINTS

	DOT DESCRIPTIONS	Cement Mason Helper	Bricklayer Helper	Stone Mason Helper	Cement Mason	Stone Mason	Bricklayer Construction
	DOT NO.	869.687-026	861.687-010	869.687-026	844.364-010	861.381-038	861.381-018
TASK NO.	TASK NAME						
M-56	Forming wind shelf						X
M-57	Building smoke chamber						X
M-58	Setting and cutting flue liners						X
M-59	Topping and capping chimney						X
M-60	Flashing chimney						X
M-61	Facing fireplace						X
M-62	Building hearth						X
M-63	Building single flue chimney						X
M-64	Building Bar-B-Que pit						X
M-65	Installing heatilator						X
	DUTY XIII - Laying Brick for						
	Ornamental Purposes						
M-66	Building a diamond pattern wall						X
M-67	Laying a basket weave bond						X
M-68	Laying a herringbone weave bond						X
M-69	Cutting and laying mitre blocks						X
M-70	Building a jack arch						X

TASK LISTING BY DOT CODE

MASONRY

		POSSIBLE EXIT POINTS					
	DOT DESCRIPTIONS	Cement Mason Helper	Bricklayer Helper	Stone Mason Helper	Cement Mason	Stone Mason	Bricklayer Construction
	DOT NO.	869.687-026	861.687-010	869.687-026	844.364-010	861.381-038	861.381-018
TASK NO.	TASK NAME						
M-71	Building a segmented arch						X
M-72	Building a soldier arch						X
M-73	Laying glass blocks						X
M-74	Laying walks and floors						X
M-75	Building planters						X
M-76	Building garden walls						X

TASK LISTING BY DOT CODE

CARPENTRY

POSSIBLE EXIT POINTS

	DOT DESCRIPTIONS	Roofer	Carpenter Helper	Rough Carpenter	Carpenter II		
	DOT NO.	860.381-010	860.664-014	860.381-042	860.681-010		
TASK NO.	TASK NAME						
	DUTY I - Measurement and Layout						
C-01	Reading a rule	X	X	X	X		
	DUTY II - Blueprint Reading						
C-02	Reading a scale			X	X		
C-03	Reading orthographic drawings			X	X		
C-04	Identifying elevations			X	X		
C-05	Identifying symbols			X	X		
C-06	Identifying structural details			X	X		
C-07	Determining information from plot plans			X	X		
	DUTY III - Selecting and Using Hand and Power Tools, Construction Materials and Fastening Devices						
C-08.	Building a sawhorse			X	X		

TASK LISTING BY DOT CODE

CARPENTRY

TASK NO.	TASK NAME	POSSIBLE EXIT POINTS DOT DESCRIPTIONS / DOT NO. Roofer 860.381-010	Carpenter Helper 860.664-014	Rough Carpenter 860.381-042	Carpenter II 860.681-010		
	DUTY IV - Laying Out and Constructing a Floor System						
C-09	Installing sills and floor joist			X	X		
C-10	Installing floor decking			X	X		
	DUTY V - Installing Walls and Frames						
C-11	Laying out, sawing and assembling exterior frame wall			X	X		
C-12	Laying out, sawing and framing windows and doors			X	X		
C-13	Laying out, cutting and installing weatherboard			X	X		
C-14	Laying out and framing a stairwell opening			X	X		
C-15	Constructing stairs				X		

TASK LISTING BY DOT CODE

CARPENTRY

		POSSIBLE EXIT POINTS					
		DOT DESCRIPTIONS: Roofer	Carpenter Helper	Rough Carpenter	Carpenter II		
TASK NO.	**TASK NAME**	DOT NO.: 860.381-010	860.664-014	860.381-042	860.681-010		
	DUTY VI - Installing Ceiling Systems						
C-16	Cutting and installing ceiling joists		X	X	X		
	DUTY VII - Building and Installing Roofing Systems						
C-17	Identifying parts of a roof	X		X	X		
C-18	Laying out, cutting and erecting common rafters as required to build a gable roof	X		X	X		
C-19	Installing a gambrel roof	X		X			
C-20	Installing a hip roof	X		X			
C-21	Installing roof decking and applying felt underlayment	X		X	X		
C-22	Laying out asphalt composition shingles	X		X	X		

TASK LISTING BY DOT CODE

CARPENTRY

		POSSIBLE EXIT POINTS					
	DOT DESCRIPTIONS	Roofer	Carpenter Helper	Rough Carpenter	Carpenter II		
TASK NO.	TASK NAME / DOT NO.	860.381-010	860.664-014	860.381-042	860.681-010		
C-23	Framing a roof opening for a chimney			X	X		
C-24	Building a porch cornice			X	X		
C-25	Building a projected box cornice			X	X		
C-26	Building a closed box cornice			X	X		
C-27	Installing dormers						
C-28	Installing flashing, roof caps and vents						
	DUTY VIII - Installing Interior Trim						
C-29	Installing drywall			X	X		
C-30	Filling nail holes, taping and floating			X	X		
C-31	Hanging wallpaper				X		
C-32	Painting drywall		X	X	X		
C-33	Stippling drywall			X	X		
C-34	Installing crown molding				X		

TASK LISTING BY DOT CODE

CARPENTRY

		POSSIBLE EXIT POINTS					
	DOT DESCRIPTIONS	Roofer	Carpenter Helper	Rough Carpenter	Carpenter II		
TASK NO.	TASK NAME / DOT NO.	860.381-010	860.664-014	860.381-042	860.681-010		
C-35	Installing interior plywood paneling				X		
C-36	Installing a pre-hung door (interior and exterior)			X	X		
C-37	Installing a door lock set				X		
C-38	Installing a pre-hung window			X	X		
C-39	Trimming out a window				X		
C-40	Installing base molding				X		
C-41	Installing sliding and folding interior doors				X		
	DUTY IX - Installing Insulation						
C-42	Installing insulation materials				X		

TASK LISTING BY DOT CODE

PLUMBING

POSSIBLE EXIT POINTS

	DOT DESCRIPTIONS	Pipe Cutter	Pipe Fitter Helper	Plumbing Assembler Installer	Plumber	Pipe Fitter	
	DOT NO.	862.682-010	862.684-022	862.684-026	862.381-030	862.381-018	
TASK NO.	TASK NAME						
	DUTY I - Identifying Careers in the Plumbing Industry						
P-01	Identifying the nature of the work of plumbers	X	X	X	X	X	
	DUTY II - Joining Pipe						
P-02	Selecting pipe and fittings	X	X	X	X	X	
P-03	Measuring pipe	X	X	X	X	X	
P-04	Cutting and reaming metal pipe	X	X	X	X	X	
P-05	Threading pipe	X	X	X	X	X	
P-06	Identifying copper fittings			X	X	X	
P-07	Laying out, cutting, reaming, flaring and flanging copper tubing	X	X	X	X	X	
P-08	Soldering copper tubing			X	X	X	
P-09	Join copper tubing to brass pipe			X	X	X	
P-10	Join copper tubing to copper pipe			X	X	X	
P-11	Join copper tubing to steel pipe			X	X	X	

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TASK LISTING BY DOT CODE

PLUMBING

TASK NO.	TASK NAME	POSSIBLE EXIT POINTS					
	DOT DESCRIPTIONS	Pipe Cutter	Pipe Fitter Helper	Plumbing Assembler Installer	Plumber	Pipe Fitter	
	DOT NO.	862.682-010	862.684-022	862.684-026	862.381-030	862.381-018	
P-12	Bending copper tubing with a spring bender	X	X	X	X	X	
P-13	Bending steel pipe	X	X	X	X	X	
P-14	Cutting cast iron soil pipe	X		X	X	X	
P-15	Caulking a lead joint on cast iron soil pipe			X	X		
P-16	Identifying plastic pipe fittings			X	X	X	
P-17	Cutting and joining plastic pipe	X		X	X	X	
P-18	Roughing-in fixtures	X			X	X	
P-19	Selecting and installing fittings and pipe				X	X	
P-20	Install vent terminals (roof flasher)			X	X	X	
	DUTY III - Installing Fixtures and Equipment						
P-21	Installing cold and hot water supply			X	X	X	

TASK LISTING BY DOT CODE

PLUMBING

POSSIBLE EXIT POINTS

	DOT DESCRIPTIONS	Pipe Cutter	Pipe Fitter Helper	Plumbing Assembler Installer	Plumber	Pipe Fitter	
	DOT NO.	862.682-010	862.684-022	862.684-026	962.381-030	862.381-018	
TASK NO.	TASK NAME						
P-22	Install cleanouts on waste lines	X		X	X		
P-23	Installing bathtubs and showers			X	X	X	
P-24	Installing a water closet			X	X	X	
P-25	Installing a wall hung lavatory			X	X	X	
P-26	Installing a kitchen sink			X	X	X	
P-27	Install electric water heaters			X	X	X	
	DUTY IV - Installing Hangers and Supports						
P-28	Supporting horizontal and vertical pipes			X	X		
	DUTY V - Installing and Cleaning Cut Off Valves						
P-29	Installing cut off valves	X		X	X	X	
P-30	Installing pressure relief valves			X	X	X	
P-31	Cleaning pressure valves		X	X	X	X	

TASK LISTING BY DOT CODE

PLUMBING

POSSIBLE EXIT POINTS

	DOT DESCRIPTIONS	Pipe Cutter	Pipe Fitter Helper	Plumbing Assembler Installer	Plumber	Pipe Fitter	
	DOT NO.	862.682-010	862.684-022	862.684-026	862.381-030	862.381-018	
TASK NO.	TASK NAME						
	DUTY VI - Insulating Water Lines						
P-32	Insulating water lines			X	X		
	DUTY VII - Installing Water Supply Systems						
P-33	Making water pressure tests on water supply systems			X	X	X	
P-34	Rough-in water supply lines for water heaters	X			X	X	
P-35	Clear obstructions from lavatory drains		X	X	X	X	
	DUTY VIII - Repairing Plumbing Fixtures						
P-36	Remove obstructions from main drain lines						

TASK LISTING BY DOT CODE

PLUMBING

		POSSIBLE EXIT POINTS					
		DOT DESCRIPTIONS	Pipe Cutter	Pipe Fitter Helper	Plumbing Assembler Installer	Plumber	Pipe Fitter
TASK NO.	**TASK NAME**	DOT NO.	862.682-010	862.684-022	862.684-026	862.381-030	862.381-018
P-37	Remove obstructions from water closet drains			X	X	X	X
P-38	Replace lavatory trap drains			X	X	X	X
P-39	Repair leaking shower valves			X	X	X	X
P-40	Repair leaking faucets or valves			X	X	X	X
P-41	Repair water flush valves on water closets			X	X	X	X
P-42	Replace a section of water supply line			X	X	X	X

TASK LISTING BY DOT CODE

RESIDENTIAL WIRING

	POSSIBLE EXIT POINTS						
	DOT DESCRIPTIONS	Electrician Helper	Electrician				
	DOT NO.	829.684-022	824.261-010				
TASK NO.	TASK NAME						
	DUTY I - Identifying Basic Electrical Theory Concepts						
EL-01	Identifying basic electrical theory	X	X				
	DUTY II - Installing 115 Volt Outlets						
EL-02	Installing single 115 volt duplex outlets	X	X				
EL-03	Wiring multiple convenience outlets	X	X				
EL-04	Wiring a switch controlled convenience outlet	X	X				
EL-05	Installing three wire branch circuits	X	X				
EL-06	Identifying code requirements for a small appliance circuit		X				
EL-07	Installing split switched receptacles	X	X				

TASK LISTING BY DOT CODE

RESIDENTIAL WIRING

		POSSIBLE EXIT POINTS					
	DOT DESCRIPTIONS	Electrician Helper	Electrician				
TASK NO.	TASK NAME / DOT NO.	829.684-022	824.261-010				
EL-08	Installing a circuit with four receptacles and one single pole switch	X	X				
EL-09	Installing five receptacles on a split circuit	X	X				
	DUTY III - Installing Overhead Lights						
EL-10	Wiring one light with a single pole switch and one outlet	X	X				
EL-11	Wiring a lighting circuit with a single pole switch	X	X				
EL-12	Wiring two lights with a single pole switch	X	X				
EL-13	Wiring two three-way switches	X	X				
EL-14	Wiring two three-way switches with two lights	X	X				

TASK LISTING BY DOT CODE

RESIDENTIAL WIRING

POSSIBLE EXIT POINTS

TASK NO.	DOT DESCRIPTIONS	Electrician Helper	Electrician				
	DOT NO.	829.684-022	824.261-010				
TASK NO.	**TASK NAME**						
EL-15	Wiring a four-way switch controlling one light	X	X				
EL-16	Wiring a master switch	X	X				
EL-17	Wiring light fixtures	X	X				
EL-18	Hanging light fixtures	X	X				
	DUTY IV - Reading a Blueprint						
EL-19	Identifying electrical symbols		X				
EL-20	Installing electrical symbols into a floor plan and estimating materials		X				
	DUTY V - Making Low Voltage Applications						
EL-21	Identifying principles and applications of transformers		X				
EL-22	Wiring low voltage transformers		X				

TASK LISTING BY DOT CODE

RESIDENTIAL WIRING

POSSIBLE EXIT POINTS

TASK NO.	TASK NAME	DOT DESCRIPTIONS: Electrician Helper DOT NO.: 829.684-022	DOT DESCRIPTIONS: Electrician DOT NO.: 824.261-010				
EL-23	Installing a push button switch		X				
EL-24	Installing bells and chimes		X				
EL-25	Wiring special low voltage circuits		X				
	DUTY VI - Making 220 Volt Connections						
EL-26	Connecting 220 volt grounded outlets		X				
EL-27	Wiring a hot water heater		X				
EL-28	Wiring ranges		X				
EL-29	Wiring baseboard type wall heaters		X				
EL-30	Installing a 230 volt cenral heating and cooling circuit and disconnect		X				
	DUTY VII - Calculating Loads						
EL-31	Calculating loads		X				

TASK LISTING BY DOT CODE

RESIDENTIAL WIRING

TASK NO.	TASK NAME	POSSIBLE EXIT POINTS					
	DOT DESCRIPTIONS	Electrician Helper	Electrician				
	DOT NO.	820.684-022	824.261-010				
EL-32	Calculating wire size and voltage drop		X				
EL-33	Making calculations for three-wire branch circuits		X				
	DUTY VIII - Installing Service Entrance and Distribution Panel						
EL-34	Selecting conduit for service entrance	X	X				
EL-35	Installing an electrical service for single phase power		X				
EL-36	Installing a circuit breaker box (or a fuse box)	X	X				
EL-37	Wiring a switch box	X	X				
EL-38	Installing ground fault interruptors		X				
EL-39	Installing a temporary service entrance	X	X				

SECTION IV

CURRICULUM STRUCTURE & COURSE OUTLINE

CURRICULUM STRUCTURE

The following examples are provided to illustrate four methods in which a secondary construction curriculum can be structured. These examples are provided to illustrate that there are many ways to structure the curriculum. Examples one through three are based on a traditional lock-step presentation of the construction materials. Students would probably all exit at approximately the same points. Example four is an organizational chart rather than a formal curriculum structure. It is based on the curriculum outline suggested by the individualized curriculum materials produced by the Georgia Department of Education. The chart assumes a planned instruction (individualized) approach which allows different students to work in all four areas simultaneously, each progressing at his or her own pace.

The fourth alternative does not prescribe which area must be studied first by a student since each segment of the program may stand alone as a specialized skill area. This method of structuring the curriculum will allow grouping students, insuring that a single section of the construction program is not over-crowded. The class considered on the organization chart contains eighteen students--eight first year students, six second year students and four third year students.

It would be impractical to assume that every class will precisely fit this pattern. This example of structuring the curriculum and for dispersing students among the separate areas of the cluster is not the only method of managing the construction program. Instead, the example suggests another alternative method for approaching this challenge to the construction instructor.

Some of the structures presented, separate classroom hours (demonstrations, lectures, etc.) from laboratory hours (practical application, live work, etc.). Others combine both laboratory and classroom hours in each course listing. Ultimately, however, local circumstances will dictate the inclusion of any task in the curriculum and students' individual needs and abilities will dictate the length of time needed for mastery.

CONSTRUCTION CURRICULUM STRUCTURE

Alternative One

Course Number	Course	Clock Hours
	First Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120
	Second Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120
	Third Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120
	Fourth Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120
	Fifth Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120
	Sixth Quarter	
	Carpentry	30
	Plumbing	30

Course Number	Course	Clock Hours
	Residential Wiring	30
	Masonry	30
		120
	Seventh Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120
	Eighth Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120
	Ninth Quarter	
	Carpentry	30
	Plumbing	30
	Residential Wiring	30
	Masonry	30
		120

CONSTRUCTION CURRICULUM STRUCTURE

Alternative Two

Course Number	Course	Clock Hours
	First Quarter	
	Measurement and Layout	10
	Blueprint Reading	12
	Selecting and Using Hand and Power Tools, Construction Materials, and Fastening Devices	20
	Performing Basic Bricklaying Manipulations	8
	Laboratory Hours	70
		120
	Second Quarter	
	Identifying Careers in the Plumbing Industry	4
	Joining Pipe	22
	Identifying Basic Electrical Theory Concepts	5
	Installing 115 Volt Outlets	17
	Laboratory Hours	72
		120
	Third Quarter	
	Laying Out and Constructing a Floor System	20
	Installing Walls and Frames	10
	Using a Brick Spacing Rule	7
	Using Working Drawings	8
	Laboratory Hours	75
		120
	Fourth Quarter	
	Joining Pipe	18
	Installing Overhead Lights	19
	Laboratory Hours	83
		120
	Fifth Quarter	
	Installing Ceiling Systems	4
	Building and Installing Roofing Systems	30

Course Number	Course	Clock Hours
	Preparing Footings and Foundations	13
	Building Double Brick Walls	4
	Laboratory Hours	69
		120
	Sixth Quarter	
	Joining Pipe	13
	Installing Fixtures and Equipment	12
	Reading a Blueprint	8
	Making Low Voltage Applications	7
	Laboratory Hours	80
		120
	Seventh Quarter	
	Building and Installing Roofing Systems	14
	Building Block Corners	7
	Laying Brick Bonds	10
	Laboratory Hours	89
		120
	Eighth Quarter	
	Installing Fixtures and Equipment	4
	Installing Hangers and Supporters	2
	Installing and Cleaning Cut Off Valves	5
	Making 220 Volt Connections	9
	Calculating Loads	8
	Laboratory Hours	92
		120
	Ninth Quarter	
	Installing Interior Trim	21
	Installing Insulation	2
	Making and Testing Concrete	18
	Mixing and Finishing Terrazzo	8
	Estimating Masonry Materials	10
	Laboratory Hours	61
		120

CONSTRUCTION CURRICULUM STRUCTURE

Alternative Three

Course Number	Course	Clock Hours
	First Semester	
	Measurement and Layout	10
	Blueprint Reading	12
	Selecting and Using Hand and Power Tools, Construction Materials, and Fastening Devices	20
	Performing Basic Bricklaying Manipulations	8
	Identifying Careers in the Plumbing Industry	4
	Joining Pipe	22
	Laboratory Hours	104
		180
	Second Semester	
	Identifying Basic Electrical Theory Concepts	5
	Installing 115 Volt Outlets	17
	Laying Out and Constructing a Floor System	20
	Installing Walls and Frames	10
	Using a Brick Spacing Rule	7
	Using Working Drawings	8
	Laboratory Hours	113
		180
	Third Semester	
	Joining Pipe	18
	Installing Overhead Lights	19
	Installing Ceiling Systems	4
	Building and Installing Roofing Systems	30
	Laboratory Hours	111
		180
	Fourth Semester	
	Preparing Footings and Foundations	13
	Building Double Brick Walls	4
	Joining Pipe	13
	Installing Fixtures and Equipment	12
	Reading a Blueprint	8

Course Number	Course	Clock Hours
	Making Low Voltage Applications	7
	Laboratory Hours	123
		180
	Fifth Semester	
	Building and Installing Roofing Systems	14
	Building Block Corners	7
	Laying Brick Bonds	10
	Installing Fixtures and Equipment	4
	Installing Hangers and Supporters	2
	Installing and Cleaning Cut Off Valves	5
	Laboratory Hours	138
		180
	Sixth Semester	
	Making 220 Volt Connections	9
	Calculating Loads	8
	Installing Interior Trim	21
	Installing Insulation	2
	Making and Testing Concrete	18
	Mixing and Finishing Terrazzo	8
	Estimating Masonry Materials	10
	Laboratory Hours	104
		180

CONSTRUCTION CLUSTER CURRICULUM STRUCTURE

(Alternative 4)

An organizational chart for grouping first, second and third year students

C	Carpentry
M	Masonry
P	Plumbing
R	Residential Wiring

Students entering the construction cluster should begin training as first year students, regardless of class standing.

First Year Students (total - 8)

Number of students in each category

1st 9 wks	M -2	C -2	R -2	P -2
2nd 9 wks	C -2	R -2	P -2	M -2
3rd 9 wks	R -2	P -2	M -2	C -2
4th 9 wks	P -2	M -2	C -2	R -2

Second Year Students (total - 6)

Number of students in each category

1st half year	M -1	P -1	C -1	R -1	M -1	C -1
2nd half year	C -1	R -1	P -1	M -1	P -1	R -1

Number of students in each category

Entire Year	C -1	P -1	R -1	M -1

Total number of students - 18

This structure shows how first, second and third year students may be grouped in a single two-hour block. The instructor would have three two-hour blocks similar to this each day.

COURSE OUTLINE

The sample course outline is to be used as an example to facilitate the development of alternative outlines for the individual learner. However, the listing of the tasks within a quarter is not meant to indicate a required sequence or pattern. Many of the tasks are independent of each other therefore allowing a student or groups of students to begin the quarter at different points. This allows better coordination of the laboratory hours and the learning objectives may be selected according to the type of laboratory practice available. The specific information required to teach the skills and related theory for each unit/task is included on the corresponding unit sheet in the Unit Guide section.

The time estimations are a minimum amount of time required and should be extended according to the learner's individual needs. The laboratory hours may be rearranged according to the needs of the learners and to any constraints imposed due to live work policies.

Exit points have been identified and are listed in chart form (refer to the table of contents). In addition the exit points are identified in the Task Listing by D. O. T. code. This will provide a means for employment for learners who master only a portion of the tasks available such as a pipe cutter or roofer. A competency record of all the tasks the learner can perform safely may be given to the prospective employers. These exit points can help improve attrition problems for schools and should prevent a feeling of failure for learners who do not complete the entire program.

The course outline will also present some advanced optional tasks which may be used by students seeking to specialize in an area of the cluster program. These are listed after the course outline based on the semester system and are presented as a task list. The corresponding unit guide sheets are located in Section V.

Suggested Course Outline Structure for Construction

Unit	Quarter I	Classroom Hours
	Competency: Measurement and Layout	
C-01	Reading a Rule	10
	Competency: Blueprint Reading	
C-02	Reading a Scale	4
C-03	Orthographic Drawings	2
C-04	Elevation Drawings	2
C-05	Symbols for Blueprints	2
C-06	Structural Information	1
C-07	Plot Plans	1
	Competency: Selecting and Using Hand and Power Tools, Construction Materials and Fastening Devices	
C-08	Building a Sawhorse	20
	Competency: Performing Basic Bricklaying Manipulations	
M-01	Spreading Mortar	2
M-02	Laying Brick to a Line	2
M-03	Building a Brick Corner	3
M-04	Cutting Brick and Block	1

Quarter I Classroom Hours	50
Quarter I Laboratory Hours	70
Total Quarter Hours	120

Quarter II

Unit		Classroom Hours
	Competency: Identifying Careers in the Plumbing Industry	
P-01	Identifying the Nature of the Work of Plumbers	4
	Competency: Joining Pipe	
P-02	Selecting Pipe and Fittings	5
P-03	Measuring Pipe	2
P-04	Cutting and Reaming Metal Pipe	4
P-05	Threading Pipe	4
P-06	Identifying Copper Fittings	3
P-07	Laying Out, Cutting, Reaming, Flaring and Flanging Copper Tubing	4
	Competency: Identifying Basic Electrical Theory Concepts	
EL-01	Identifying Basic Electrical Theory Concepts	5
	Competency: Installing 115 Volt Outlets	
EL-02	Installing a Single 115 Volt Duplex Outlet	2
EL-03	Wiring Multiple Convenience Outlets	2
EL-04	Wiring a Switch Controlled Convenience Outlet	2
EL-05	Installing Three-Wire Branch Circuit	2
EL-06	Identifying Code Requirements for a Small Appliance Circuit	2
EL-07	Installing Split Switched Receptacles	2
EL-08	Installing a Circuit with Four Receptacles and One Single Pole Switch	2
EL-09	Installing Five Receptacles on a Split Circuit	3
	Quarter II Classroom Hours	48
	Quarter II Laboratory Hours	72
	Total Quarter Hours	120

Quarter III

Unit		Classroom Hours
	Competency: Laying Out and Constructing a Floor System	
C-09	Installing Sills and Floor Joists	6
C-10	Installing Floor Decking	6
C-15	Constructing Stairs	8
	Competency: Installing Walls and Frames	
C-11	Laying Out, Sawing and Assembling Exterior Wall Frame	6
C-12	Laying Out, Sawing and Framing Windows and Doors	6
C-13	Laying Out, Cutting and Installing Weatherboard	4
C-14	Laying Out and Framing a Stairwell Opening	4
	Competency: Using a Brick Spacing Rule	
M-05	Determining Spacing for Standard Size Brick	4
M-06	Laying Out Courses to Sill and Cornice Height	2
M-07	Interpreting and Using a Line Modular Rule	1
	Competency: Using Working Drawings	
M-08	Dimensioning and Scaling a Working Drawing	4
M-09	Identifying Names and Uses of Lines and Symbols on a Working Drawing	2
M-10	Identifying Different Views and Their Uses on Working Drawings	2

Quarter III Classroom Hours	55
Quarter III Laboratory Hours	65
Total Quarter Hours	120

Quarter IV

Unit		Classroom Hours
	Competency: Joining Pipe	
P-08	Soldering Copper Tubing	4
P-09	Joining Copper Tubing to Brass Pipe	3
P-10	Joining Copper Tubing to Copper Pipe	2
P-11	Joining Copper Tubing to Steel Pipe	2
P-12	Bending Copper Tubing with a Spring Bender	1
P-13	Bending Steel Pipe	2
P-14	Cutting Cast Iron Soil Pipe	2
P-15	Caulking a Lead Joint on Cast Iron Soil Pipe	2
	Competency: Installing Overhead Lights	
EL-10	Wiring a Light with a Single Pole Switch and One Outlet	2
EL-11	Wiring a Lighting Circuit with a Single Pole Switch	2
EL-12	Wiring Two Lights with a Single Pole Switch	2
EL-13	Wiring Two Three-Way Switches	2
EL-14	Wiring Two Three-Way Switches with Two Lights	3
EL-15	Wiring a Four-Way Switch Controlling One Light	2
EL-16	Wiring a Master Switch	2
EL-17	Wiring Light Fixtures	2
EL-18	Hanging Fixtures	2

Quarter IV Classroom Hours	37
Quarter IV Laboratory Hours	83
Total Quarter Hours	120

Quarter V

Unit		Classroom Hours
	Competency: Installing Ceiling Systems	
C-16	Cutting and Installing Ceiling Joists	4
	Competency: Building and Installing Roofing Systems	
C-17	Identifying Parts of a Roof	2
C-18	Laying Out, Cutting and Erecting Common Rafters as Required to Build a Gable Roof	8
C-19	Installing a Gambrel Roof	8
C-20	Installing a Hip Roof	8
C-21	Installing Roof Decking and Applying Felt Underlayment	4
C-22	Laying Out Asphalt Composition Shingles	6
	Competency: Preparing Footings and Foundations	
M-11	Setting Batter Boards	3
M-12	Inspecting Grading at Building Site	2
M-13	Finishing Grading at Building Site	2
M-14	Setting Frames for Footing/Foundations	2
M-15	Installing Steel Reinforcing	1
M-16	Operating a Transit	2
M-17	Pouring Footing	1
	Competency: Building Double Brick Walls	
M-18	Laying an Eight Inch Wall with Header	1
M-19	Building an L-Shaped Eight Inch Wall with Header Courses, Header Caps and Rowlocks	1
M-20	Constructing Cavity Walls	2
	Quarter V Classroom Hours	57
	Quarter V Laboratory Hours	63
	Total Quarter Hours	120

Quarter VI

Unit		Classroom Hours
	Competency: Joining Pipe	
P-16	Identifying Plastic Pipe Fittings	3
P-17	Cutting and Joining Plastic Pipe	1
P-18	Roughing-in Fixtures	3
P-19	Selecting and Installing Fittings and Pipe	3
P-20	Installing Vent Terminals (Roof Flashing)	6
	Competency: Installing Fixtures and Equipment	
P-21	Installing Cold and Hot Water Supply	3
P-22	Installing Clean-Outs on Waste Lines	5
P-23	Installing Bathtubs and Showers	3
P-24	Installing a Water Closet	2
P-25	Installing a Wall Hung Lavatory	2
	Competency: Reading a Blueprint	
EL-19	Identifying Electrical Symbols	4
EL-20	Installing Electrical Symbols into a Floor Plan and Estimating Materials	4
	Competency: Making Low Voltage Applications	
EL-21	Identifying Principles and Applications of Transformers	2
EL-22	Wiring a Low Voltage Transformer	2
EL-23	Installing a Push Button Switch	1
EL-24	Installing Bells and Chimes	1
EL-25	Wiring Special Low Voltage Circuits	1

Quarter VI Classroom Hours	46
Quarter VI Laboratory Hours	74
Total Quarter Hours	120

Quarter VII

Unit		Classroom Hours
	Competency: Building and Installing Roofing Systems	
C-23	Framing a Roof Opening for a Chimney	6
C-24	Building a Porch Cornice	4
C-25	Building a Projected Box Cornice (for Brick Veneer Construction)	4
C-26	Building a Closed Box Cornice	4
C-27	Installing Dormers	12
C-28	Installing Flashing, Roof Caps and Vents	6
	Competency: Building Block Corners	
M-21	Laying a Four Inch Block Corner in Running Bond	2
M-22	Laying an Eight Inch Blcok Corner in Running Bond	1
M-23	Building a Six Inch Block Corner in Running Bond	1
M-24	Building a Twelve Inch Block Corner in Running 1/2 Bond	2
M-25	Laying a Block Corner in Stacked Bond	1
	Competency: Laying Brick Bonds	
M-26	Building an English Corner	4
M-27	Building a Dutch Corner	2
M-28	Laying a Flemish Bond	2
M-29	Laying an English Bond	2
	Quarter VII Classroom Hours	53
	Quarter VII Laboratory Hours	67
	Total Quarter Hours	120

Quarter VIII

Unit		Classroom Hours
	Competency: Installing Fixtures and Equipment	
P-26	Installing a Kitchen Sink	2
P-27	Installing Electric Water Heaters	6
	Competency: Installing Hangers and Supporters	
P-28	Supporting Horizontal and Vertical Pipes	6
	Competency: Installing and Cleaning Out Off Valves	
P-29	Installing Cut Off Valves	6
P-30	Installing Pressure Relief Valves	6
P-31	Cleaning Pressure Regulating Valves	4
P-32	Insulating Water Lines	4
	Competency: Making 220 Volt Connections	
EL-26	Connecting 220 Volt Grounded Outlets	2
EL-27	Wiring a Hot Water Heater	1
EL-28	Wiring Ranges	1
EL-29	Wiring Baseboard Type Wall Heaters	1
EL-30	Installing a 230 Volt Central Heating or Cooling Circuit and Disconnect	4
	Competency: Calculating Loads	
EL-31	Calculating Loads	4
EL-32	Calculating Wire Size and Voltage Drop	2
EL-33	Making Calculations for Three Wire Branch Circuits	2

Quarter VIII Classroom Hours	51
Quarter VIII Laboratory Hours	69
Total Quarter Hours	120

Quarter IX

Unit		Classroom Hours
	Competency: Installing Interior Trim	
C-29	Installing Drywall	3
C-30	Filling Nail Holes, Taping and Floating	8
C-31	Hanging Wallpaper	8
C-32	Painting Drywall	1
C-33	Stippling Drywall	4
C-34	Installing Crown Molding	10
C-35	Installing Interior Plywood Paneling	6
C-36	Installing a Pre-hung Door (interior and exterior)	1
C-37	Installing a Door Lock Set	2
C-38	Installing a Pre-hung Window	2
C-39	Trimming Out a Window	4
C-40	Installing Base Molding	4
C-41	Installing Sliding and Folding Interior Doors	6
	Competency: Installing Insulation	
C-42	Installing Insulation Materials	3
	Competency: Making and Testing Concrete	
M-30	Making and Testing Concrete	6
M-31	Finishing Concrete	6
M-32	Estimating Concrete	6
	Competency: Mixing and Finishing Terrazzo	
M-33	Mixing and Finishing Terrazzo	8
	Competency: Estimating Masonry Materials	
M-34	Estimating Masonry Materials	10
	Quarter IX Classroom Hours	98
	Quarter IX Laboratory Hours	22
	Total Quarter Hours	120

Suggested Course Outline Structure for Construction

Unit	Semester I	Classroom Hours
	Competency: Measurement and Layout	
C-01	Reading a Rule	10
	Competency: Blueprint Reading	
C-02	Reading a Scale	4
C-03	Orthographic Drawings	2
C-04	Elevation Drawings	2
C-05	Symbols for Blueprints	2
C-06	Structural Information	1
C-07	Plot Plans	1
	Competency: Selecting and Using Hand and Power Tools, Construction Materials and Fastening Devices	
C-08	Building a Sawhorse	20
	Competency: Performing Basic Bricklaying Manipulations	
M-01	Spreading Mortar	2
M-02	Laying Brick to a Line	2
M-03	Building a Brick Corner	3
M-04	Cutting Brick and Block	1
	Competency: Identifying Careers in the Plumbing Industry	
P-01	Identifying the Nature of the Work of Plumbers	4
	Competency: Joining Pipe	
P-02	Selecting Pipe and Fittings	5
P-03	Measuring Pipe	2
P-04	Cutting and Reaming Metal Pipe	4

Unit		Classroom Hours
P-05	Threading Pipe	4
P-06	Identifying Copper Fittings	3
P-07	Laying Out, Cutting, Reaming, Flaring and Flanging Copper Tubing	4

Semester I Classroom Hours	76
Semester I Laboratory Hours	104
Total Semester Hours	180

Semester II

Unit		Classroom Hours
	Competency: Identifying Basic Electrical Theory Concepts	
EL-01	Identifying Basic Electrical Theory Concepts	5
	Competency: Installing 115 Volt Outlets	
EL-02	Installing a Single 115 Volt Duplex Outlet	2
EL-03	Wiring Multiple Convenience Outlets	2
EL-04	Wiring a Switch Controlled Convenience Outlet	2
EL-05	Installing Three Wire Branch Circuit	2
EL-06	Identifying Code Requirements for a Small Appliance Circuit	2
EL-07	Installing Split Switched Receptacles	2
EL-08	Installing a Circuit with Four Receptacles and One Single Pole Switch	2
EL-09	Installing Five Receptacles on a Split Circuit	3
	Competency: Laying Out and Constructing a Floor System	
C-09	Installing Sills and Floor Joists	6
C-10	Installing Floor Decking	6
C-15	Constructing Stairs	8
	Competency: Installing Walls and Frames	
C-11	Laying Out, Sawing and Assembling Exterior Wall Frame	6
C-14	Laying Out and Framing a Stairwell Opening	4
	Competency: Using a Brick Spacing Rule	
M-05	Determining Spacing for Standard Sized Brick	4
M-06	Laying Out Courses to Sill and Cornice Height	2
M-07	Interpreting and Using a Line Modular Rule	1

Unit		Classroom Hours
	Competency: Using Working Drawings	
M-08	Dimensioning and Scaling a Working Drawing	4
M-09	Identifying Names and Uses of Lines and Symbols on a Working Drawing	2
M-10	Identifying Different Views and Their Uses on Working Drawings	2
	Semester II Classroom Hours	67
	Semester II Laboratory Hours	113
	Total Semester Hours	180

Semester III

Unit		Classroom Hours
	Competency: Joining Pipe	
P-08	Soldering Copper Tubing	4
P-09	Joining Copper Tubing to Brass Pipe	3
P-10	Joining Copper Tubing to Copper Pipe	2
P-11	Joining Copper Tubing to Steel Pipe	2
P-12	Bending Copper Tubing with a Spring Bender	1
P-13	Bending Steel Pipe	2
P-14	Cutting Cast Iron Soil Pipe	2
P-15	Caulking a Lead Joint on Cast Iron Soil Pipe	2
	Competency: Installing Overhead Lights	
EL-10	Wiring a Light with a Single Pole Switch and One Outlet	2
EL-11	Wiring a Lighting Circuit with a Single Pole Switch	2
EL-12	Wiring Two Lights with a Single Pole Switch	2
EL-13	Wiring Two Three Way Switches	2
EL-14	Wiring Two Three Way Switches with Two Lights	3
EL-15	Wiring a Four Way Switch Controlling One Light	2
EL-16	Wiring a Master Switch	2
EL-17	Wiring Light Fixtures	2
EL-18	Hanging Fixtures	2
	Competency: Installing Ceiling Systems	
C-16	Cutting and Installing Ceiling Joists	4
	Competency: Building and Installing Roofing Systems	
C-17	Identifying Parts of a Roof	2
C-18	Laying Out, Cutting and Erecting Common Rafters as Required to Build a Gable Roof	8
C-19	Installing a Gable Roof	8
C-20	Installing a Hip Roof	8

Unit		Classroom Hours
C-21	Installing Roof Decking and Applying Felt Underlayment	4
C-22	Laying Out Composition Shingles	6

Semester III Classroom Hours	77
Semester III Laboratory Hours	103
Total Semester Hours	180

Semester IV

Unit		Classroom Hours
	Competency: Preparing Footings and Foundations	
M-11	Setting Batter Boards	3
M-12	Inspecting Grading at Building Site	2
M-13	Finishing Grading at Building Site	2
M-14	Setting Frames for Footing/Foundations	2
M-15	Installing Steel Reinforcing	1
M-16	Operating a Transit	2
M-17	Pouring Footing	1
	Competency: Building Double Brick Walls	
M-18	Laying an Eight Inch Wall with Header	1
M-19	Building an L Shaped Eight Inch Wall with Header Courses, Header Caps and Rowlocks	1
M-20	Constructing Cavity Walls	2
	Competency: Joining Pipe	
P-16	Identifying Plastic Pipe Fittings	3
P-17	Cutting and Joining Plastic Pipe	1
P-18	Roughing-in Fixtures	3
P-19	Selecting and Installing Fittings and Pipe	3
P-20	Installing Vent Terminals (Roof Flashing)	6
	Competency: Installing Fixtures and Equipment	
P-21	Installing Cold and Hot Water Supply	3
P-22	Installing Clean-outs on Waste Lines	5
P-23	Installing Bathtubs and Showers	3
P-24	Installing a Water Closet	2
P-25	Installing a Wall Hung Lavatory	2
	Competency: Reading a Blueprint	
EL-19	Identifying Electrical Symbols	4
EL-20	Installing Electrical Symbols into a Floor Plan and Estimating Materials	4

Unit		Classroom Hours
	Competency: Making Low Voltage Applications	
EL-21	Identifying Principles and Applications of Transformers	2
EL-22	Wiring a Low Voltage Transformer	2
EL-23	Installing a Push Button Switch	1
EL-24	Installing Bells and Chimes	1
EL-25	Wiring Special Low Voltage Circuits	1
	Semester IV Classroom Hours	63
	Semester IV Laboratory Hours	117
	Total Semester Hours	180

Semester V

Unit		Classroom Hours
	Competency: Building and Installing Roofing Systems	
C-23	Framing a Roof Opening For a Chimney	6
C-24	Building a Porch Cornice	4
C-25	Building a Projected Box Cornice (for Brick Veneer Construction)	4
C-26	Building a Closed Box Cornice	4
C-27	Installing Dormers	12
C-28	Installing Flashing, Roof Caps and Vents	6
	Competency: Building Block Corners	
M-21	Laying a Four Inch Block Corner in Running Bond	2
M-22	Laying an Eight Inch Block Corner in Running Bond	1
M-23	Building a Six Inch Block Corner in Running Bond	1
M-24	Building a Twelve Inch Block Corner in Running ½ Bond	2
M-25	Laying a Block Corner in Stacked Bond	1
	Competency: Laying Brick Bonds	
M-26	Building an English Corner	4
M-27	Building a Dutch Corner	2
M-28	Laying a Flemish Bond	2
M-29	Laying and English Bond	2
	Competency: Installing Fixtures and Equipment	
P-26	Installing a Kitchen Sink	2
P-27	Installing Electric Water Heaters	6
	Competency: Installing Hangers and Supporters	
P-28	Supporting Horizontal and Vertical Pipes	6
	Competency: Installing and Cleaning Cut Off Valves	
P-29	Installing Cut Off Valves	6
P-30	Installing Pressure Relief Valves	6
P-31	Cleaning Pressure Regulating Valves	4

Unit		Classroom Hours
P-32	Insulating Water Lines	4
	Semester V Classroom Hours	87
	Semester V Laboratory Hours	93
	Total Semester Hours	180

Semester VI

Unit		Classroom Hours
	Competency: Making 220 Volt Connections	
EL-26	Connecting 220 Volt Grounded Outlets	2
EL-27	Wiring a Hot Water Heater	1
EL-28	Wiring Ranges	1
EL-29	Wiring Baseboard Type Wall Heaters	1
EL-30	Installing a 230 Volt Central Heating or Cooling Circuit and Disconnect	4
	Competency: Calculating Loads	
EL-31	Calculating Loads	4
EL-32	Calculating Wire Size and Voltage Drop	2
EL-33	Making Calculations for Three Wire Branch Circuits	2
	Competency: Installing Interior Trim	
C-29	Installing Dry Wall	3
C-30	Filling Nail Holes, Taping and Floating	8
C-31	Hanging Wall Paper	8
C-32	Painting Drywall	1
C-33	Stippling Drywall	4
C-34	Installing Crown Molding	10
C-35	Installing Interior Plywood Paneling	6
C-36	Installing a Pre-Hung Door (interior and exterior)	1
C-37	Installing a Door Lock Set	2
C-38	Installing a Pre-Hung Window	2
C-39	Trimming Out a Window	4
C-40	Installing Base Moding	4
C-41	Installing Sliding and Folding Interior Doors	6
	Competency: Installing Insulation	
C-42	Installing Insulation Materials	3
	Competency: Making and Testing Concrete	
M-30	Making and Testing Concrete	6
M-31	Finishing Concrete	6
M-32	Estimating Concrete	6
	Competency: Mixing and Finishing Terrazzo	
M-33	Mixing and Finishing Terrazzo	8

Competency: Estimating Masonry Materials

M-34	Estimating Masonry Materials		10
		Semester VI Classroom Hours	115
		Semester VI Laboratory Hours	65
		Total Semester Hours	180

OPTIONAL TASKS FOR ADVANCED OR SPECIALIZED STUDENTS

Unit		Hours
	Electrical Wiring	
EL-34	Selecting Conduit for Service Entrance	2
EL-35	Installing an Electrical Service Entrance for Single Phase Power	3
EL-36	Installing a Circuit Breaker Box (or fuse box)	3
EL-37	Wiring a Switch Box	3
EL-38	Installing Ground Fault Interrupters	2
EL-39	Installing a Temporary Service Entrance	2
	Plumbing	
P-33	Making Water Pressure Tests on Water Supply Systems	6
P-34	Roughin-In Water Supply Lines for Water Heaters	6
P-35	Clearing Obstructions from Lavatory Drains	4
P-36	Removing Obstructions from a Main Drain Line	6
P-37	Removing Obstructions from Water Closet Drains	3
P-38	Replacing Lavatory Trap Drains	4
P-39	Repairing Leaking Shower Valves	6
P-40	Repairing Leaking Faucets and Valves	6
P-41	Repairing Water Flush Valves on Water Closets	4
P-42	Replacing a Section of Water Supply Line	6
	Masonry	
M-27	Building a Dutch Corner	2
M-28	Laying a Flemish Bond	2
M-29	Laying an English Bond	2
M-30	Making and Testing Concrete	6
M-31	Finishing Concrete	6
M-32	Estimating Concrete	6
M-33	Mixing and Finishing Terrazzo	8
M-34	Estimating Masonry Materials	10
M-35	Setting Corner Poles	2
M-36	Laying Reinforced Brick Masonry	2
M-37	Setting Lintels	1
M-38	Making Reinforced Lintels	1
M-39	Setting Door Frames	1
M-40	Using Anchors to Tie Doors to Walls	1
M-41	Setting Window Frames	1
M-42	Laying Soldier Courses	1
M-43	Laying Rowlock Sills	1

Unit		Hours
M-44	Placing Expansion Joints	2
M-45	Building Brick Steps	1
M-46	Constructing Glazed Tile Walls	2
M-47	Laying Structural Clay Tile	2
M-48	Waterproofing Walls	2
M-49	Setting Stone	2
M-50	Cleaning Brickwork	3
M-51	Building Rough Fireplace and Ash Pit	1
M-52	Setting Clean-Out Door	1
M-53	Forming Firebox	3
M-54	Setting Ash Dump	1
M-55	Assembling and Setting Damper	1
M-56	Forming Wind Shelf	1
M-57	Building Smoke Chamber	2
M-58	Setting and Cutting Flue Liners	1
M-59	Topping and Capping Chimney	2
M-60	Flashing Chimney	1
M-61	Facing Fireplace	2
M-62	Building Hearth	3
M-63	Building Single Flue Chimney	2
M-64	Building Bar-B-Que Pit	1
M-65	Installing Heatilator	2
M-66	Building a Diamond Pattern Wall	1
M-67	Laying a Basket Weave Bond	1
M-68	Laying a Herringbone Weave Bond	1
M-69	Cutting and Laying Mitre Blocks	1
M-70	Building a Jack Arch	1
M-71	Building a Segmental Arch	1
M-72	Building a Soldier Arch	1
M-73	Laying Glass Blocks	2
M-74	Laying Walks and Floors	2
M-75	Building Planters	2
M-76	Building Garden Walls	1

SECTION V

UNIT GUIDES

UNIT GUIDES

Description

In this section the tasks to be taught in each course are presented in sequential order. Each task is listed on a separate page so that it may be taken out of the guide for daily lesson planning or regrouped with other tasks to fit the individual teacher's own preference for teaching order. The task pages may be used for planning and executing group instruction or for individualized instruction. Each page in the UNIT GUIDES section contains the following information:

TASK: This is a short and concise statement of the task to be taught.

PERFORMANCE OBJECTIVE: The performance expected of the student after completing the unit is stated in stem form, without a specific statement of all conditions, equipment, and performance standard (these are listed in a criterion referenced measure in the Evaluation section of the task page).

INSTRUCTIONAL ACTIVITIES: Suggested learning activities are presented. These activities include providing information, demonstration, use of audio-visuals, and practical applications.

INSTRUCTIONAL MATERIALS: The materials that are necessary to carry out the instructional activities are listed. These include textbooks, instructional units, audio-visuals and equipment.

EVALUATION: This section contains a criterion referenced measure (where appropriate) and reference to any test items or other evaluation measures that are available to the teacher. The criterion referenced measure contains three parts--Condition, Performance and Standard.

CLASSROOM HOURS: The estimated time for completion of the instructional activities and the evaluation are indicated. This time estimate is stated in hours of classroom time (lectures, presentations, demonstrations, etc). Additional time will be required for hands-on experience in the laboratory. Estimates for this time can be found in the Course Structure and Course Outline sections.

TASK

M-01 Spreading mortar

PERFORMANCE OBJECTIVE

Demonstrate manipulations of the trowel.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Mix mortar
b. Identify and use trowel
c. Wet mortar board
d. Place mortar on board
e. Load trowel
f. Distribute mortar
g. Furrow mortar
h. Seal mortar to trowel

Provide Demonstration On:

a. Mixing mortar
b. Spreading mortar

Provide Practical Application On:

a. Mixing mortar
b. Spreading mortar

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh
c. Putnam

A/Vs:

Georgia, slide set BSB-1

Student Manuals:

Georgia, Unit BSB-1

Tools and Equipment:

a. Mortar board
b. Trowel

CLASSROOM HOURS

2

EVALUATION (M-01)

Given appropriate tools, equipment and supplies, the student will mix mortar to correct consistency and butter a 24" 2 X 4 on all sides in 12 seconds or less.

TASK

M-02 Laying brick to a line

PERFORMANCE OBJECTIVE

Lay brick plumb, level and to the line with uniform joints.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Lay out project
b. Identify and use masonry rules
c. Identify and use line pin
d. Identify and use line blocks
e. Identify and use level horizontally and vertically
f. Set line blocks and line
g. Set twig
h. Prepare head joints
i. Place bricks without touching line
j. Cut excess mortar

Provide Demonstration On:

a. Setting up to lay brick to a line
b. Laying brick to a line

Provide Practical Application On:

Setting up for and laying brick to a line

INSTRUCTIONAL MATERIALS

Textbooks:

a. Cook and Trent
b. Dezettel

A/Vs:

Georgia, slide set BSB-2

Student Manuals:

a. Georgia, Unit BSB-2
b. Kreh, Unit 15

Tools and Equipment:

a. Mortar board
b. Trowel
c. Line and line blocks
d. Level

CLASSROOM HOURS	2

EVALUATION (M-02)

Given adequate supplies and materials, the student will be able to lay bricks to the line. Bricks must be laid square, straight, plumb and within those guide lines of the VICA U.S. Skill Olympics Bricklaying Judge Sheet.

TASK

M-03 Building a brick corner

PERFORMANCE OBJECTIVE

Build a brick corner which is plumb and level.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify and use framing square
b. Mark the square line on floor
c. Drybonding
d. Position materials
e. Temper mortar
f. Lay initial course
g. Tuck pointing
h. Joint corner
i. Check for plumb and square
j. Check for correct height

Provide Demonstration On:

a. Setting up to build a brick corner
b. Building the brick corner

Provide Practical Application On:

Setting up for and building a brick corner

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Putnam

A/Vs:

Georgia, slide set BSB-3

Student Manuals:

a. Georgia, Unit BSB-3
b. Kreh, Unit 16

Tools and Equipment:

a. Mortar board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS

3

EVALUATION (M-03)

Given adequate tools and materials, the student will be able to rack back 45 brick corner using the VICA U.S. Skill Olympics Bricklaying Judge Sheet. Carefully check corner for:

1. Plumb
2. Square
3. Level
4. Correct height

TASK

M-04 Cutting brick and block

PERFORMANCE OBJECTIVE

Cut brick and block by various methods.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify and use brick hammer
b. Identify and use brick set
c. Identify and use masonry saw (portable and fixed)

Provide Demonstration On:

Cutting a quarter closure, queen closure, half closure, (bat), three quarter closure and trimming the cut

Provide Practical Application On:

Cutting brick and block in the various methods

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh
c. Putnam

A/Vs:

Georgia, slide set BSB-4

Student Manuals:

Georgia, Unit BSB-4

Tools and Equipment:

a. Brick hammer
b. Brick set

CLASSROOM HOURS

1

EVALUATION (M-04)

Given adequate tools and materials, the student will demonstrate an ability to cut brick and block using:

1. Brick hammer
2. Trowel
3. Brick set
4. Masonry saw (portable and fixed)

Bricks will be cut according to specifications designated by the instructor.

TASK

M-05 Determining spacing for standard sized brick

PERFORMANCE OBJECTIVE

Demonstrate knowledge of spacing requirements.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify brick spacing rule
b. Explain purpose of brick spacing rules and spacing
c. Identify essential spacings by course number
d. Read spacing rule
e. Use rule to estimate number of courses needed

Provide Demonstration On:

Reading and using a brick spacing rule

Provide Practical Application On:

Reading and using a brick spacing rule

INSTRUCTIONAL MATERIALS

Textbooks:

Putnam

A/Vs:

Georgia, slide set BSR-1

Student Manuals:

Georgia, Unit BSR-1

Tools and Equipment:

Spacing rule

CLASSROOM HOURS 4

EVALUATION (M-05)

Given adequate tools and materials, the student will demonstrate an ability to:

1. Read the spacing rule
2. Read the modular rule (block)
3. Determine number of courses

The work will be evaluated using the VICA U.S. Skill Olympics Bricklaying Judge Sheet.

TASK

M-06 Laying out courses to sill and cornice height

PERFORMANCE OBJECTIVE

Layout coursing to sill or cornice height, plumb and level.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Locate and identify sill
b. Locate and identify cornice
c. Layout to sill using brick spacing rule
d. Layout to cornice from sill using brick spacing rule

Provide Demonstration On:

a. Locating and identifying sill and cornice
b. Laying courses to sill or cornice

Provide Practical Application On:

Laying courses to sill or cornice

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezzettel
b. Putnam

Student Manuals:

Georgia, Unit BSR-2

Tools and Equipment:

a. Mortar board
b. Trowel
c. Modular and spacing rules
d. Level

CLASSROOM HOURS 2

EVALUATION (M-06)

Given adequate tools and materials, the student will demonstrate an ability to layout sill and cornice by:

1. Figuring correct number of courses
2. Using the spacing rule
3. Laying to correct specifications window openings with brick and block

The work will be evaluated using the VICA U.S. Skill Olympics Bricklaying Judge Sheets.

TASK

M-07 Interpreting and using a line modular rule

PERFORMANCE OBJECTIVE

Lay brick to proper height and level with use of rules.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify modular rule
b. Explain purpose of modular rule
c. Read and use modular rule
d. How to layout for standard brick, concrete block, red tile and Roman brick

Provide Demonstration On:

Proper use of the modular rule

Provide Practical Application On:

Interpreting and using the modular rule

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh

A/Vs:

Georgia, slide set BSR-3

Student Manuals:

Georgia, Unit BSR-3

Tools and Equipment:

Modular rule

CLASSROOM HOURS 1

EVALUATION (M-07)

Given adequate tools and materials, the student will demonstrate an ability to lay course work accurately by using a modular rule. Resulting work must be level, plumb and the correct height.

TASK

M-08 Dimensioning and scaling a working drawing

PERFORMANCE OBJECTIVE

Dimension and scale a working drawing.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Dimension lines
b. Reading dimensions
c. Scaling lines on blueprint using architect's scale
d. Scaling lines on blueprint using 6' folding rule
e. Reading dimensions as noted on blueprint

Provide Demonstration On:

a. Use of architect's scale
b. Use of 6' folding rule to read dimensions

Provide Practical Application On:

Have student measure dimensions using architect's scale and 6' rule.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Tools and Equipment:

a. Working drawing
b. Architect's scale
c. 6' folding rule

CLASSROOM HOURS	4

EVALUATION (M-08)

a. Given a blueprint, architect's scale and a 6' folding rule, the student will take dimensions from a blueprint. The reading must be exact.

b. B. I. A., Plan Reading for Brickmasons

c. B. I. A., Blueprint Reading and Sketching Basic Course

TASK

M-09 Identifying names and uses of lines and symbols on a working drawing

PERFORMANCE OBJECTIVE

Identify the names and uses of lines and symbols on a working drawing.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. How different lines are drawn and their uses
b. Identifying different lines as used on blueprint
c. Knowing the use of each line
d. Identifying symbols on blueprint

Provide Practical Application On:

Have a student identify different lines on a working drawing and explain their uses.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

CLASSROOM HOURS 2

EVALUATION (M-09)

a. Given a blueprint, the student will identify the use of the different lines found on it. The student must also identify the symbols for different construction materials.

b. B. I. A., Plan Reading for Brickmasons

c. B. I. A., Blueprint Reading and Sketching Basic Course

TASK

M-10 Identifying different views on a working drawing and their uses

PERFORMANCE OBJECTIVE

On a working drawing, identify different views and their uses.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Different views and their uses
b. Identify plan view
c. Identify elevation view
d. Identify section view
e. Identify detail drawing

Provide Practical Application On:

Have student identify and explain the use of different views.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

CLASSROOM HOURS

2

EVALUATION (M-10)

a. Given a blueprint, the student will recognize what portion of the structure each view represents.

b. B. I. A., Plan Reading for Brickmasons

c. B. I. A., Blueprint Reading and Sketching Basic Course

TASK

M-11 Setting batter boards

PERFORMANCE OBJECTIVE

Layout and set batter board.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. 6, 8, 10 method
b. Use of transit
c. Locating building site
d. Layout drive stakes for batter board
e. Marking foundation height at corners using transit
f. Nailing top of batter boards at these points
g. Keeping batter boards level
h. Squaring corners
i. Attaching lines

Provide Demonstration On:

a. Layout by 6, 8, 10 method
b. Layout using transit

Provide Practical Application On:

Have student lay out and set batter boards using one of the two methods.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. B. I. A.

A/Vs:

B. I. A., "Laying Out A Foundation"

Student Manuals:

B. I. A., Project 34

Tools and Equipment:

a. Batter boards
b. Transit
c. 100' tape

CLASSROOM HOURS

3

EVALUATION (M-11)

a. Given batter boards, transit and 100' steel tape, the student will layout and set batter boards for a building. The student will check work by using 6, 8, 10 method. Batter boards will be set level and building lines must be square.

b. B. I. A., Bricklaying Vocational Training

c. B. I. A., Bricklaying III

TASK

M-12 Inspecting grading at building site

PERFORMANCE OBJECTIVE

Inspect type of soil to determine type and size of footing.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of soil
b. Bearing capacity of soil
c. Type and sizes of footings
d. Actions of weather on footings
e. Recognizing different types of soil
f. Recognizing which soil is best through the poorest for bearing capacity
g. Identifying best type of footing for each soil
h. Determining the effects of freezing on footings

Provide Practical Application On:

Have student explain types of soil and what to do on poor bearing soil.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B. I. A.
b. Dalzell and Townsend

CLASSROOM HOURS 2

EVALUATION (M-12)

a. Given various on-site samples, the student will identify the different types and bearing loads of soil. The student will also identify what types and sizes of footing to put in different soils.

b. B. I. A., Bricklaying I

TASK

M-13 Finishing grading at building site

PERFORMANCE OBJECTIVE

Grade to proper depth and fine grade for proper footings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Shapes of footings
b. Types of soil
c. Foundation blueprints
d. Purpose of footings
e. Determining depth of grade from specifications
f. Excavating
g. Keeping sides straight and bottom level

Provide Practical Application On:

Have student determine, from blueprint, the proper grading depth.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B. I. A.
b. Dalzell and Townsend

Tools and Equipment:

a. Blueprint
b. 6' folding rule

CLASSROOM HOURS 2

EVALUATION

(M-13)

a. Given a blueprint, the student will be able to determine the proper depth and proper type of footing. The student will grade the sides and bottom according to blueprint specifications.

b. B. I. A., Bricklaying I

TASK

M-14 Setting frames for footing and foundations

PERFORMANCE OBJECTIVE

Set forms for concrete.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of forms
b. Requirements of forms

Provide Demonstration On:

a. Placing forms
b. Bracing forms

Provide Practical Application On:

Have student set form for footing.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Proper lumber
b. Saw
c. Hammer
d. Nails

CLASSROOM HOURS

2

EVALUATION (M-14)

Given proper tools and materials, the student will set a form for concrete footings. The form must be straight, square and rigidly braced.

TASK

M-14 Setting frames for footing and foundations

PERFORMANCE OBJECTIVE

Set forms for concrete.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of forms
b. Requirements of forms

Provide Demonstration On:

a. Placing forms
b. Bracing forms

Provide Practical Application On:

Have student set form for footing.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Proper lumber
b. Saw
c. Hammer
d. Nails

CLASSROOM HOURS 2

EVALUATION (M-14)

Given proper tools and materials, the student will set a form for concrete footings. The form must be straight, square and rigidly braced.

TASK

M-14 Setting frames for footing and foundations

PERFORMANCE OBJECTIVE

Set forms for concrete.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of forms
b. Requirements of forms

Provide Demonstration On:

a. Placing forms
b. Bracing forms

Provide Practical Application On:

Have student set form for footing.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Proper lumber
b. Saw
c. Hammer
d. Nails

CLASSROOM HOURS

2

EVALUATION (M-14)

Given proper tools and materials, the student will set a form for concrete footings. The form must be straight, square and rigidly braced.

TASK

M-14 Setting frames for footing and foundations

PERFORMANCE OBJECTIVE

Set forms for concrete.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of forms
b. Requirements of forms

Provide Demonstration On:

a. Placing forms
b. Bracing forms

Provide Practical Application On:

Have student set form for footing.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Proper lumber
b. Saw
c. Hammer
d. Nails

CLASSROOM HOURS 2

EVALUATION (M-14)

Given proper tools and materials, the student will set a form for concrete footings. The form must be straight, square and rigidly braced.

TASK

M-15 Installing steel reinforcing

PERFORMANCE OBJECTIVE

Layout and install reinforcing rods.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Kinds of rods
b. Sizes of rods
c. Methods of installing rods

Provide Demonstration On:

a. Tying rods
b. Placing rods

Provide Practical Application On:

Have student place and tie rods.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Reinforcing rods
b. Tie wire
c. Side cutting pliers

CLASSROOM HOURS	1

EVALUATION (M-15)

Given steel reinforcing rods and proper tools, the student will place and tie reinforcing rods according to manufacturer's specifications.

TASK

M-16 Operating a transit

PERFORMANCE OBJECTIVE

Set up and use a transit.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Care of transit
b. Uses of transit
c. How to set up transit
d. How to operate transit
e. Leveling and squaring with a transit

Provide Demonstration On:

a. Set up of transit
b. Operating transit

Provide Practical Application On:

Have student set up a transit and use it to level and square.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Tools and Equipment:

a. Transit
b. Tripod
c. Surveyor's rod
d. 6' Folding rule

CLASSROOM HOURS 2

EVALUATION (M-16)

Given transit, surveyor's rod or 6' folding rule, the student will set up a transit. The student will level and square a foundation.

TASK

M-17 Pouring footing

PERFORMANCE OBJECTIVE

Grade stakes and pour concrete footings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Finding correct height
b. Properties of concrete

Provide Demonstration On:

a. Setting grade stakes
b. Pouring and smoothing concrete

Provide Practical Application On:

Have student set stakes and pour concrete.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B. I. A.
b. Dalzell and Townsend

Tools and Equipment:

a. Shovel
b. Rake
c. Float
d. Grade stakes
e. Concrete

CLASSROOM HOURS 1

EVALUATION (M-17)

a. Given prepared ditches and proper tools, the student will set grade stakes for a given height and pour concrete to the top of the grade stakes.

b. Performance Guide, V'TECS, p. 19

TASK

M-18 Laying an 8" wall with header

PERFORMANCE OBJECTIVE

Lay an 8" wall with header.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Layout for the initial course
b. Procedure for building
c. Lay initial course
d. Plumb and level initial course
e. Lay proceeding courses
f. Construct corner leads
g. Lay header course

Provide Demonstration On:

a. Laying out the double brick wall
b. Constructing corner leads
c. Laying the wall

Provide Practical Application On:

Laying out and constructing an 8" brick wall with header

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Putnam

A/Vs:

Georgia, slide set DBW-1

Student Manuals:

a. Georgia, Unit DBW-1
b. Kreh, Unit 15
c. B.I.A., Projects 2, 3 and 6

Tools and Equipment:

a. Mortar board
b. Trowel
c. Level
d. Spacing rule

CLASSROOM HOURS

1

EVALUATION (M-18)

Given adequate tools and materials, the student will demonstrate an ability to dry bond initial course, interpret drawing on proceeding courses, lay courses to proper height indicated on plan and run rowlock cap on wall. All work will be evaluated using the VICA U.S. Skill Olympics Bricklaying Evaluation Sheet.

TASK

M-19 Building an L-shaped 8" wall with header courses, header caps and rowlocks

PERFORMANCE OBJECTIVE

Build an 8", L-shaped wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Methods of positioning brick and laying out the initial course
b. Plumbing and leveling the initial course
c. Lay proceeding courses
d. Plumbing and leveling proceeding courses
e. Procedure for laying rowlock caps, header caps and header courses
f. Strike joints and clean wall

Provide Demonstration On:

a. How to position brick for an 8" wall
b. How to lay 8" corners and walls with header courses, header caps and rowlocks

Provide Practical Application On:

Laying 8" corners and walls with header courses, header caps and rowlocks

INSTRUCTIONAL MATERIALS

Textbooks:

Dezettel

A/Vs:

Georgia, slide set DBW-1

Student Manuals:

a. Kreh, Unit 22
b. Georgia, Units DBW-2, DBW-3 and DBW-4

Tools and Equipment:

a. Mortar board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS 1

EVALUATION (M-19)

Given adequate tools, materials and plans, the student will build an eight inch L-shaped wall with header courses, header caps and rowlocks. The resulting work will be straight, level and plumb. The overall work will be judged using the VICA U.S. Skill Olympics Bricklaying Evaluation Sheet.

TASK

M-20 Constructing cavity walls

PERFORMANCE OBJECTIVE

Construct cavity walls.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of cavity walls
b. Purpose of flashing and weep holes
c. Flashing
d. Through wall bonding
e. Metal ties

Provide Demonstration On:

a. Installing flashing
b. Layout of cavity wall
c. Making weep holes

Provide Practical Application On:

Have student build cavity

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Student Manuals:

B.I.A., Project 7

Tools and Equipment:

a. Mason tool bag
b. Flashing material
c. Brick and mortar

CLASSROOM HOURS	2

EVALUATION (M-20)

a. Given tools and materials, the student will construct cavity walls that are level and straight. Flashing must be installed to drain water toward the outside wall and weep holes must be kept clear of mortar.

b. Performance Guide, V'TECS, p. 32

TASK

M-21 Laying a 4" block corner in running board

PERFORMANCE OBJECTIVE

Lay a block corner in running board.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify a 4" block
b. Explaining purposes of 4" block
c. Lay out initial course
d. Laying and plumbing initial course
e. Level initial course
f. Lay plumb and level each proceeding course

Provide Demonstration On:

a. Setting up to build a 4" block corner
b. Building a 4" block corner

Provide Practical Application On:

Setting up for and building a 4" block corner

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh
c. Putnam

A/Vs:

a. Georgia, slide set CD-1
b. Georgia, slide set CBC-1
c. Georgia, slide set CBC-2

Student Manuals:

Georgia, Unit CBC-2

Tools and Equipment:

a. Trowel
b. Mortar board
c. Framing square
d. Level

CLASSROOM HOURS

2

EVALUATION (M-21)

a. Given adequate tools and materials, the student will lay a 4" block corner in running bond which is plumb, level and square.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-22 Laying an 8" block corner in running bond

PERFORMANCE OBJECTIVE

Lay a block corner with 8" block.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify an 8" block
b. Identify and explain purpose of multi-purpose block
c. Identify and explain purpose of stretcher block
d. Lay out initial course
e. Lay, plumb and level initial course
f. Laying proceeding courses

Provide Demonstration On:

Setting up to build
1. Block corner
2. Building the block corner

Provide Practical Application On:

Setting up for and building a brick corner

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh
c. Putnam

A/Vs:

a. Georgia, slide set CD-1
b. Georgia, slide set CBC-1
c. Georgia, slide set CBC-2

Student Manauls:

Georgia, Unit CBC-1

Tools and Equipment:

a. Trowel
b. Mortar board
c. Framing square
d. Level

CLASSROOM HOURS

1

EVALUATION (M-22)

a. Given adequate tools and materials, the student will lay an 8" block corner in running bond which is plumb, level and square.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p.67

TASK

M-23 Building a 6" block corner in running bond

PERFORMANCE OBJECTIVE

Lay a block corner with 6" block.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify a 6" block
b. Explain purpose of 6" block
c. Layout initial course
d. Drybond initial course
e. Lay initial course
f. Plumb and level initial course
g. Lay, plumb and level each proceeding course
h. Cleaning corner

Provide Demonstration On:

a. Setting up to build a 6" block corner
b. Building the block corner

Provide Practical Application On:

Setting up for and building a 6" block corner

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh
c. Putnam

A/Vs:

a. Georgia, slide set CD-1
b. Georgia, slide set CBC-1
c. Georgia, slide set CBC-2

Student Manuals:

Georgia, Unit CBC-3

Tools and Equipment:

a. Trowel
b. Mortar board
c. Framing square
d. Level

CLASSROOM HOURS

1

EVALUATION (M-23)

a. Given adequate tools and materials, the student will lay a 6" block in running bond which is plumb, level and square. (Note: Elbow or "L" blocks are required to course out properly on 6" corners).

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-24 Building a 12" block corner in running 1/2 bond

PERFORMANCE OBJECTIVE

Lay a block corner with 12" block in 1/2 running bond.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify 12" block
b. Explain purpose of 12" block
c. Layout initial course
d. How to drybond and lay the courses

Provide Demonstration On:

a. Setting up to build a 12" block corner in 1/2 bond
b. Building a 12" block corner in 1/2 bond

Provide Practical Application On:

Setting up for and building a 12" block corner in 1/2 bond

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh
c. Putnam

A/Vs:

a. Georgia, slide set CD-1
b. Georgia, slide set CBC-1
c. Georgia, slide set CBC-2

Student Manuals:

Georgia, Unit CBC-4

Tools and Equipment:

a. Mortar Board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS

2

EVALUATION (M-24)

a. Given adequate tools and materials, the student will lay a 12" block corner in running bond which is plumb, level and squre.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-25 Lay a block corner in stacked bond

PERFORMANCE OBJECTIVE

Lay a block corner out of 8" block.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify and explain purpose of stacked bond
b. Layout initial course
c. Mounting and hanging line
d. Lay initial course
e. Plumbing and leveling initial course
f. Lay proceeding courses
g. Plumb and level proceeding courses

Provide Demonstration On:

a. Setting up to build a block corner in stacked bond
b. Building the 8" block corner

Provide Practical Application On:

Setting up for and building a 8" block corner

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh
c. Putnam

A/Vs:

a. Georgia, slide set CD-1
b. Georgia, slide set CBC-1
c. Georgia, slide set CBC-2

Student Manuals:

Georgia, Unit CBC-5

Tools and Equipment:

a. Mortar board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS

1

EVALUATION (M-25)

a. Given adequate tools and materials, the student will lay an 8" block corner in stacked bond which is plumb, level and square.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-26 Building an English corner

PERFORMANCE OBJECTIVE

Build an English corner.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify English corner
b. Explain purpose of English corner
c. Identify and explain use of stretcher brick and header brick
d. Layout initial course
e. Plumb and level initial course
f. Lay proceeding courses

Provide Demonstration On:

a. Setting up to build an English corner
b. Building an English corner

Provide Practical Application On:

Setting up for and building an English corner

INSTRUCTIONAL MATERIALS

Textbooks:

Kreh

A/Vs:

Georgia, slide set LBB-1

Student Manuals:

Georgia, Unit LBB-1

Tools and Equipment:

a. Mortar board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS

4

EVALUATION (M-26)

a. Given adequate tools and materials, the student will build a return corner in English bond. Work will be accurate, square and plumb.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-27 Building a Dutch corner

PERFORMANCE OBJECTIVE

Lay a Dutch corner.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify and explain purpose of Dutch corner
b. Layout of initial course
c. Plumb and level initial course
d. Lay proceeding courses
e. Plumb and level proceeding courses

Provide Demonstration On:

a. Setting up to build a Dutch corner
b. Building the Dutch corner

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh

A/Vs:

a. Georgia, slide set LBB-1
b. B.I.A., "Brick Bonds"

Student Manuals:

Georgia, Unit LBB-2

Tools and Equipment:

a. Mortar board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS

2

EVALUATION (M-27)

a. Given adequate tools and materials, the student will accurately build a Dutch corner which is square and plumb.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-28 Laying a Flemish bond

PERFORMANCE OBJECTIVE

Lay a Flemish bond.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose of the Flemish bond
b. How to lay the Flemish bond
c. When to lay a Flemish bond
d. Laying the initial and other courses

Provide Demonstration On:

a. Setting up to lay Flemish bond
b. Laying the Flemish bond

Provide Practical Application On:

Setting up for and laying Flemish bond

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Kreh

A/Vs:

a. Georgia, slide set LBB-1
b. B.I.A., "Brick Bonds"

Student Manuals:

a. Georgia, Unit LBB-3

Tools and Equipment:

a. Mortar board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS

2

EVALUATION (M-28)

a. Given adequate tools and materials, the student will build a 3" wall five courses high in Flemish bond with standard sized brick.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-29 Laying an English bond

PERFORMANCE OBJECTIVE

Lay an English bond.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose of English bond
b. Lay out of initial course
c. Plumbing and leveling initial course
d. Laying proceeding courses
e. Plumb and level proceeding courses

Provide Demonstration On:

a. Setting up to lay English bond
b. Laying English bond

Provide Practical Application On:

Setting up for and laying English bond

INSTRUCTIONAL MATERIALS

Textbooks:

Dezettel

A/Vs:

a. Georgia, slide set LBB-1
b. B.I.A., "Brick Bonds"

Student Manuals:

a. Georgia, Unit LBB-4

Tools and Equipment:

a. Mortar board
b. Framing square
c. Trowel
d. Level

CLASSROOM HOURS

2

EVALUATION (M-29)

a. Given adequate tools and materials, the student will build a wall 5 courses high in English bond from standard sized brick.

b. Bricklaying Rating Sheet, VICA U.S. Skills Olympics Regulations, VICA, p. 67

TASK

M-30 Making and testing concrete

PERFORMANCE OBJECTIVE

Mix concrete to regulations and test for acceptability.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Mix concrete
b. Identify and explain purpose of cone
c. Determine slump
d. Lab test

Provide Demonstration On:

a. Setting up materials to make and test concrete
b. Making and testing concrete

Provide Practical Application On:

Setting up materials for making and testing concrete

INSTRUCTIONAL MATERIALS

Textbooks:

a. Cook and Trent
b. Dezettel
c. Putnam

A/Vs:

Georgia, slide set CM-1

Student Manuals:

Georgia, Unit CM-1

Tools and Equipment:

a. Mixer
b. Cone
c. Rod

CLASSROOM HOURS 6

EVALUATION (M-30)

Given adequate tools and materials, the student will mix concrete with the proper ratio and consistency.

TASK

M-31 Finishing concrete

PERFORMANCE OBJECTIVE

Finish concrete.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identify and explain use of a screed
b. Identify and explain use of a hand and ball float
c. Identify and explain use of finishing trowel and edger
d. Identify and explain use of a jointer
e. Identify and explain use of forms
f. Build form and fill with concrete
g. Screed and smooth edges of concrete with hand float
h. Use edger to smooth outside
i. Layout joint lines
j. Trowel concrete to smooth finish

Provide Demonstration On:

a. Setting up materials and equipment to finish concrete
b. Finishing concrete

Provide Practical Application On:

Setting up and finishing concrete

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Putnam

A/Vs:

Georgia, slide set CM-1

Student Manuals:

Georiga, Unit CM-2

Tools and Equipment:

a. Screed
b. Hand and ball float
c. Finishing trowel and edger
d. Jointer
e. Forms

CLASSROOM HOURS 6

EVALUATION (M-31)

Given adequate tools and materials, the student will demonstrate proper steps in finishing concrete.

TASK

M-32 Estimating concrete

PERFORMANCE OBJECTIVE

Use formulas for estimating concrete.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Explain purpose of estimating concrete
b. Methods used in estimating concrete
c. Use formula to estimate concrete

Provide Demonstration On:

a. Setting up formula for estimating concrete
b. Estimating concrete

Provide Practical Application On:

a. Using proper formula for estimating concrete
b. Using the shorter method for estimating concrete

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dezettel
b. Putnam
c. Wagner

Student Manuals:

Georgia, Units CM-3 and CM-3b

CLASSROOM HOURS

6

EVALUATION (M-32)

Given various slab dimensions, the student will accurately estimate needed concrete within 5%. The student should demonstrate a knowledge of two different methods (formulas) of estimating.

TASK

M-33 Mixing and finishing terrazzo

PERFORMANCE OBJECTIVE

Mix and finish terrazzo.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of terrazzo
b. Mixture of terrazzo
c. Procedure to pour and finish terrazzo
d. Pipe screeding terrazzo
e. Seeding surface

Provide Demonstration On:

a. Mixing terrazzo
b. Seeding surface
c. Troweling the finish
d. Grinding and cleaning the slab

Provide Practical Application On:

Mixing, pouring and finishing terrazzo

INSTRUCTIONAL MATERIALS

A/Vs:

Georgia, slide set TS-1

Student Manuals:

Georgia, Units TS-1, TS-2 and TS-3

Tools and Equipment:

a. 3 inch pipe
b. Hammer
c. Finishing trowel
d. Wet rags
e. 40, 80 and 120 grit stones

CLASSROOM HOURS 8

EVALUATION (M-33)

Given appropriate tools and materials, the student will mix terrazzo, pour into forms, cure and grind to a specified finish. Finished job should be level, ground to an appropriate finish and clean.

TASK

M-34 Estimating masonry materials

PERFORMANCE OBJECTIVE

Estimate the amount of masonry needed for a job.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Masonry materials estimating
b. Formula for estimating brick
c. Formula for estimating concrete block
d. Formula for estimating sand
e. Formula for estimating mortar mix
f. Estimate entire masonry job

Provide Demonstration On:

Estimating the various parts of masonry work

Provide Practical Application On:

Estimating all portions of a masonry job

INSTRUCTIONAL MATERIALS

Student Manuals:

Georgia, Units ME-1a, ME-1b, ME-1c, ME-2a, ME-2b, ME-2c and ME-3

CLASSROOM HOURS 10

EVALUATION (M-34)

Given building plans, the student will make a complete masonry materials and cost estimate, including the following masonry units:

1. Brick
2. Block
3. Sand
4. Mortar mix
5. Concrete

The estimate should be within 5% of predetermined estimates.

TASK

M-35 Setting corner poles

PERFORMANCE OBJECTIVE

Set corner poles for brickwork.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of corner poles
b. Layout and lay first course of brick
c. Placing corner pole in proper position at bottom
d. Fastening bottom of story pole
e. Plumbing story pole
f. Fastening top in place
g. Checking for plumb

Provide Demonstration On:

Set up of corner poles

Provide Practical Application On:

Have student set corner poles.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

A/Vs:

B.I.A., "Corner Poles"

Student Manuals:

a. B.I.A., Project Sheets
b. B.I.A., Project 32

Tools and Equipment:

a. Mason tool bag
b. Corner poles

CLASSROOM HOURS

2

EVALUATION (M-35)

a. Given corner poles and fittings, the student will set corner poles on a job. Corner poles must be plumb.

b. B.I.A., Bricklaying Vocational Training

TASK

M-36 Laying reinforced brick masonry

PERFORMANCE OBJECTIVE

Lay a wall using reinforced brick masonry.

INSTRUCTIONAL ACTIVITIES

Provide Informaton On:

a. Uses of reinforced brick masonry
b. Sizes of reinforcing rods

Provide Demonstration On:

a. Placement of rods
b. Grouting of cavity

Provide Practical Application On:

Have student lay wall, place rods and grout cavity.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Reinforcing rods
c. Brick and mortar

CLASSROOM HOURS 2

EVALUATION (M-36)

a. Given necessary tools and materials, the student will lay a reinforced brick wall. Wall must be plumb, level and straight. Rods must be placed according to manufacturer's specifications. Grout must be puddled and have no air pockets. Reinforcement wire must be placed horizontally 16 inches on center and must not be exposed to the face of the wall.

b. Performance Guide, V'TECS, p. 57

TASK

M-37 Making reinforced lintels

PERFORMANCE OBJECTIVE

Make a reinforced lintel for an 8" block wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Different types of lintels
b. Length of lintel

Provide Demonstration On:

Building temporary term to support work

Provide Practical Application On:

Have student lay bond beam blocks, place reinforcing rods and pour lintel.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Tools and Equipment:

a. Form material
b. Saw
c. Bond beam blocks
d. Reinforcing rods
e. Concrete

CLASSROOM HOURS

1

EVALUATION (M-37)

Provided with necessary tools and materials, the student will build a temporary template, lay bond beam blocks, place reinforcing rods and pour concrete in cavity.

TASK

M-38 Setting lintels

PERFORMANCE OBJECTIVE

Set lintel over opening in masonry wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Proper bearing on jambs
b. Kinds of lintels
c. Leveling lintel

Provide Demonstration On:

Setting concrete lintel

Provide Practical Application On:

Have student set lintel.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Tools and Equipment:

a. Level
b. Lintel
c. Trowel
d. Mortar

CLASSROOM HOURS 1

EVALUATION (M-38)

a. Given necessary tools and equipment, the student will set a concrete lintel. Lintel must be level and the face of lintel plumb with the outside of the wall. Lintel must be bearing at least 6" on each jamb.

b. Performance Guide, V'TECS, p. 78

TASK

M-39 Setting door frames

PERFORMANCE OBJECTIVE

Set door frame in masonry wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Tying door frame to wall
b. Bracing door frame
c. Placing struts in frame

Provide Demonstration On:

Setting door frame

Provide Practical Application On:

Have student set, brace and place struts in door frame.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Tools and Equipment:

a. Hammer and nails
b. Level
c. Wedges
d. Bracing
e. Saw

CLASSROOM HOURS

1

EVALUATION (M-39)

Provided with tools and materials, the student will set a door frame in a masonry wall. The sides of frame must be standing plumb and straight, the top of frame must be level and the frame must be braced rigidly in place. The student must also demonstrate a knowledge of tying the frame to the wall.

TASK

M-40 Using anchors to tie doors to walls

PERFORMANCE OBJECTIVE

Tie door bucks to wall using anchors.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of door frames
b. Types of anchors

Provide Demonstration On:

Placing anchors

Provide Practical Application On:

Have student place anchors and build around them.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Tools and Equipment:

a. Mason tool bag
b. Anchors
c. Brick and mortar

CLASSROOM HOURS 1

EVALUATION (M-40)

a. Given T anchors, masonry material, mason's tools and a steel door frame that is set in place, the student will be able to install anchors in door frame and build around them. Anchors must be placed at bottom, middle and top of doorbuck and locked in behind flange according to building specifications. Doorbuck must be level and plumb.

b. Performance Guide, V'TECS, p. 58

TASK

M-41 Setting window frames

PERFORMANCE OBJECTIVE

Set window frame in masonry wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Layout procedures
b. Care in handling
c. Safety

Provide Demonstration On:

Setting window

Provide Practical Application On:

Have student layout and set window.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Tools and Equipment:

a. Plumb rule
b. 6' folding rule
c. Window
d. Working drawing

CLASSROOM HOURS

1

EVALUATION (M-41)

Given plumb rule, window, 6' folding rule and working drawing, the student will layout and set a window. The sides, bottom and top must fit tightly in opening and the frames must be plumb and square with wall. The window must open, close and lock without binding.

TASK

M-42 Laying soldier course

PERFORMANCE OBJECTIVE

Lay soldier course.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

Uses of soldier courses

Provide Demonstration On:

a. Buttering brick
b. Keeping brick plumb

Provide Practical Application On:

Have student lay soldier course.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

CLASSROOM HOURS 1

EVALUATION (M-42)

Given necessary tools, brick and mortar, the student will lay a soldier course. Each brick must be standing plumb and the wall must be straight.

TASK

M-43 Laying lowlock sills

PERFORMANCE OBJECTIVE

Layout and lay brick sills.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Projection of brick
b. Lengths of brick
c. Laying out courses using spacing rule
d. Laying brick at each end with proper slope and projection
e. Pulling line on work
f. Laying remaining brick in sill

Provide Demonstration On:

a. Keeping smooth surface
b. Keeping brick tight against window

Provide Practical Application On:

Have student build a sill.

INSTRUCTIONAL MATERIALS

Textbooks:

Ray

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

CLASSROOM HOURS

1

EVALUATION (M-43)

Given mason tools and supplies, the student will lay a window sill. All brick must be smooth on top of sill, tight against bottom of window and slope to outside. Projection of brick must be equalized.

TASK

M-44 Placing expansion joints

PERFORMANCE OBJECTIVE

Place expansion joint in a masonry wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Kinds of expansion joints
b. Uses of expansion joints
c. Determining kind of expansion joint from blueprint
d. Determining place in wall for expansion joint
e. Keeping joint straight and plumb
f. Removing excess mortar from expansion joint

Provide Demonstration On:

Installing expansion joint

Provide Practical Application On:

Have student install expansion joint.

INSTRUCTIONAL MATERIALS

Textbook:

Ray

Tools and Equipment:

Expansion joint

CLASSROOM HOURS 2

EVALUATION (M-44)

Given expansion joint, the student will install the expansion joint in a masonry wall. All mortar and pieces of masonry material must be removed from the joint. The joint must be plumb and straight.

TASK

M-45 Building brick steps

PERFORMANCE OBJECTIVE

Build a set of 3 tread brick steps.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Riser height
b. Tread width
c. Layout of steps
d. Slope of treads
e. Determining number of steps
f. Laying out steps dry
g. Laying flat course
h. Level, straight-edged and square flat course
i. Laying first rowlock course
j. Level, plumb, square and straight-edged
k. Laying alternate flat and rowlock course on remainder of steps
l. Striking and brushing all joints

Provide Demonstration On:

Layout work

Provide Practical Application On:

Have student build a set of 3 tread brick steps.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Brick and mortar

CLASSROOM HOURS 1

EVALUATION (M-45)

a. Provided with mason tools and material, the student will build a set of 3 tread brick steps. Risers should be 7" high and treads 12" wide with a ½" slope on treads to the outside of steps.

b. B.I.A., Plan Reading for Brickmasons.

TASK

M-46 Constructing glazed tile walls

PERFORMANCE OBJECTIVE

Build glazed tile wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Composition of glazed tile
b. Colors of glazed tile
c. Cleaning of glazed tile
d. Care of tile
e. Different shapes of tile
f. Laying out dry bond
g. Determining sizes of pieces to be cut
h. Cutting pieces on masonry saw
i. Laying wall

Provide Demonstration On:

a. Laying out bond
b. Cutting pieces
c. Laying glazed tile

Provide Practical Application On:

Have student lay out bond, cut necessary pieces and lay tile wall.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Glazed tile
c. Masonry saw
d. Mortar

CLASSROOM HOURS 2

EVALUATION (M-46)

a. Given mason tools, saw and glazed tile, the student will layout and build a wall using glazed tile. The work should be plumb, level and straight.

b. B.I.A., Bricklaying III

TASK

M-47 Laying structural clay tile

PERFORMANCE OBJECTIVE

Lay structural clay tile.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types and uses
b. Differences in finishes
c. Methods of laying

Provide Demonstration On:

a. End construction
b. Side construction

Provide Practical Application On:

Have student lay tile.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Structural tile
c. Mortar

CLASSROOM HOURS

2

EVALUATION (M-47)

a. Provided with necessary tools, mortar and structural clay tile, the student will lay tile in end construction and side construction. The work must be plumb, level and straight.

b. Performance Guide, V'TECS, p. 90

TASK

M-48 Waterproofing walls

PERFORMANCE OBJECTIVE

Identify procedures for waterproofing walls.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Kinds of waterproofing
b. How to waterproof

Provide Demonstration On:

Waterproofing walls

Provide Practical Application On:

Have student student study and become familiar with ways to waterproof walls.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Student Manuals:

B.I.A., Plan Reading for Brickmasons

CLASSROOM HOURS

2

EVALUATION (M-48)

Given various situations where masonry walls need waterproofing, the student will identify the most appropriate waterproofing methods. The student's answers will be judged correctly from the instructor's professional viewpoint and from published text.

TASK

M-49 Setting stone

PERFORMANCE OBJECTIVE

Set limestone sills and coping.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Safety in handling
b. Method of setting

Provide Demonstration On:

Setting stone

Provide Practical Application On:

Have student set sills and coping.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Stone
c. Wedges
d. Mortar

CLASSROOM HOURS 2

EVALUATION (M-49)

Provided with necessary mason tools and supplies, the student will set limestone sills and coping. The stone should be laid straight and level with joints properly pointed to shed water.

TASK

M-50 Cleaning brickwork

PERFORMANCE OBJECTIVE

Identify masonry stains and clean mortar stains from brickwork.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Safety
b. Proper mixing
c. Methods of cleaning
d. Different stains and causes

Provide Demonstration On:

a. Safety
b. Mixing acid with water

Provide Practical Application On:

Have student clean masonry wall.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Scraping tool
b. Brushes
c. Acid
d. Water hose

CLASSROOM HOURS

3

EVALUATION (M-50)

a. Given brushes, scrapers, acid and water hose, the student will mix water and acid in proper proportions and clean mortar stains on brickwork. The student must adhere to all safety rules. The student must also know what causes different stains and various methods of cleaning stains.

b. Performance Guide, V'TECS, p. 30

TASK

M-51 Building tough fireplace and ash pit

PERFORMANCE OBJECTIVE

Lay brick for rough fireplace and ash pit.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Fire hazards
b. Corbeling brick

Provide Demonstration On:

a. Corbeling brick
b. Layout of chimney

Provide Practical Application On:

Have student build a rough fireplace with ash pit.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. Ray

A/Vs:

B.I.A., "Fireplace Construction"

Tools and Equipment:

a. Mason's tool bag
b. Brick and mortar

CLASSROOM HOURS

1

EVALUATION (M-51)

Given necessary tools and materials, the student will build a rough fireplace and ash pit according to local building codes.

TASK

M-52 Setting clean-out door

PERFORMANCE OBJECTIVE

Set clean-out door in ash pit wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Location Of door
b. Laying out for door

Provide Demonstration On:

a. Preparation of inside wall
b. Setting clean-out door

Provide Practical Application On:

Have student set clean-out door.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Mason tool bag
b. Clean-out door
c. Mortar

CLASSROOM HOURS 1

EVALUATION (M-52)

a. Given a clean-out door and necessary tools, the student will install a clean-out door. The door must be level and airproof.

b. Performance Guide, V'TECS, p. 64

TASK

M-53 Forming firebox

PERFORMANCE OBJECTIVE

Lay firebrick to form firebox.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Radiant heat
b. Conducted heat
c. Composition of firebrick
d. Mortar for firebrick
e. Theory of fireplaces

Provide Demonstration On:

a. Layout work
b. Laying firebrick
c. Finishing joints

Provide Practical Application On:

Have student build a firebox.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. Ray
c. B.I.A.

A/Vs:

B.I.A., "Fireplace Construction"

Tools and Equipment:

a. Mason tool bag
b. Firebrick
c. Mortar

CLASSROOM HOURS

3

EVALUATION (M-53)

a. Given firebrick, mortar and necessary tools, the student will lay firebrick to form a firebox for a fireplace. The student shall keep proper splay and slope to sides and back of firebox to fit the damper.

b. Performance Guide, V'TECS, pp 69-71

TASK

M-54 Setting ash dump

PERFORMANCE OBJECTIVE

Set ash dump in firebox floor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Composition
b. Locating position of ash dump
c. Measuring size of dump

Provide Demonstration On:

Setting ash dump

Provide Practical Application On:

Have student set ash dump.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Mason tool bag
b. Ash dump

CLASSROOM HOURS

1

EVALUATION (M-54)

a. Given ash dump and proper tools, the student will set an ash dump. The ash dump must fit tightly on the firebox floor.

b. Performance Guide, V'TECS, p. 63

TASK

M-55 Assembling and setting damper

PERFORMANCE OBJECTIVE

Assemble and seal damper in place.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Safety
b. Theory of dampers
c. Sizes and kinds of dampers

Provide Demonstration On:

a. Assembling damper
b. Sealing damper

Provide Practical Application On:

Have student assemble and set damper.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. Ray
c. B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Damper
c. Screwdriver
d. Pliers

A/Vs:

B.I.A., "Fireplace Construction"

CLASSROOM HOURS 1

EVALUATION (M-55)

a. Given a damper and proper tools, the student will assemble a damper according to manufacturer's specifications. Set and seal damper in place. Work will be judged correct if no holes or cracks are left in mortar.

b. Performance Guide, V'TECS, p. 65

TASK

M-56 Forming wind shelf

PERFORMANCE OBJECTIVE

Place mortar to form wind shelf.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Theory of chimney draft
b. Filling behind back of firebrick with brick, leaving work 2 courses of brick low
c. Spreading mortar on top of fill
d. Smoothing mortar and leave in concave shape
e. Removing excess mortar from damper

Provide Demonstration On:

Forming wind shelf

Provide Practical Application On:

Have student form wind shelf.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. Ray

Tools and Equipment:

a. Trowel
b. Mortar

CLASSROOM HOURS 1

EVALUATION (M-56)

a. Given mortar and brick trowel, the student will properly spread and parge mortar to form a wind shelf. The wind shelf must be concaved having no holes or cracks left in the mortar.

b. Dalzell and Townsend, Bricklaying Skill and Practice

TASK

M-57 Building smoke chamber

PERFORMANCE OBJECTIVE

Corbel brick to build smoke chamber.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Corbeling
b. Safety
c. Laying brick around damper, plumb for three courses to clear damper lid
d. Corbeling remaining courses from sides and front until size of flue liner is obtained
e. Parging all work on inside of smoke chamber
f. Removing excess mortar from damper and wind shelf

Provide Demonstration On:

a. Corbeling
b. Parging

Provide Practical Application On:

Have student build smoke chamber.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

A/Vs:

B.I.A., "Fireplace Construction"

CLASSROOM HOURS 2

EVALUATION (M-57)

a. Given mortar, brick and mason tools, the student will lay brick to form a smoke chamber. No brick should stick over the brick more than 1 inch. Work should be parged and completely fireproof.

b. Dalzell and Townsend, Bricklaying Skill and Practice

c. B.I.A., Bricklaying III

TASK

N 58 Setting and cutting flue liners

PERFORMANCE OBJECTIVE

Cut and set flue liners over the smoke chamber.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Procedures for cutting
b. Safety
c. Composition of flue liners
d. Sizes of flue liners
e. Shapes of flue liners

Provide Demonstration On:

a. Cutting flue liner
b. Setting flue liner

Provide Practical Application On:

Have student cut and set a flue liner.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend
c. Ray

A/Vs:

B.I.A., "Fireplace Construction"

Tools and Equipment:

a. Mason tool bag
b. Face sheild
c. Flue liners

CLASSROOM HOURS 1

EVALUATION (M-58)

a. Given flue liners and proper tools, the student will set flue liners in mortar bed. Flue liners must be even with the ones under it. Mortar should be smoothed on the inside with no holes left in the mortar joint. The flue liner must be cut on a straight line without cracking.

b. Performance Guide, V'TECS, p.62

TASK

M-59 Topping and capping chimney

PERFORMANCE OBJECTIVE

Lay brick to top out chimney and spread mortar for wash.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Protecting flashing
b. Sloping wash
c. Height of flue liner
d. Height of chimney above roof
e. Lay outside brick of chimney to 18" above ridge
f. Corbel last two courses ½" to outside for drip
g. Filling inside void
h. Placing mortar for wash
i. Sloping wash to outside to shed water
j. Striking joints and brush work

Provide Demonstration On:

Sloping of wash

Provide Practical Application On:

Have student top and cap chimney.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. Ray
c. B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

CLASSROOM HOURS 2

EVALUATION (M-59)

a. Given brick, mortar and mason tools, the student will lay brick to cap out a chimney. Brick should be plumb, level and straight-edged. The student will put wash on chimney with proper slope so as to shed water.

b. B.I.A., Bricklaying Vocational Training

c. Dalzell and Townsend, Bricklaying Skill and Practice

TASK

M-60 Flashing chimney

PERFORMANCE OBJECTIVE

Cut and place flashing in chimney.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Kinds of flashing
b. Placing flashing
c. Sealing flashing
d. Securing flashing

Provide Demonstration On:

a. Cutting flashing
b. Placing flashing
c. Sealing and securing flashing

Provide Practical Application On:

Have student flash chimney without puncturing flashing.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Flashing material
b. Tin snips
c. Pitch

CLASSROOM HOURS

1

EVALUATION (M-60)

a. Given flashing material, pitch and proper tools, the student will flash a chimney. Work must be waterproof, smooth and tightly secured.

b. Performance Guide, V'TECS, p. 84

TASK

M-60 Flashing chimney

PERFORMANCE OBJECTIVE

Cut and place flashing in chimney.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Kinds of flashing
b. Placing flashing
c. Sealing flashing
d. Securing flashing

Provide Demonstration On:

a. Cutting flashing
b. Placing flashing
c. Sealing and securing flashing

Provide Practical Application On:

Have student flash chimney without puncturing flashing.

INSTRUCTIONAL MATERIALS

Textbooks:

Dalzell and Townsend

Tools and Equipment:

a. Flashing material
b. Tin snips
c. Pitch

CLASSROOM HOURS 1

EVALUATION (M-60)

a. Given flashing material, pitch and proper tools, the student will flash a chimney. Work must be waterproof, smooth and tightly secured.

b. Performance Guide, V'TECS, p. 84

TASK

M-61 Facing fireplace

PERFORMANCE OBJECTIVE

Lay brick to build face for fireplace.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of materials used
b. Fire hazards
c. Methods of bonding
d. Laying out courses to lintel height using brick spacing rule
e. Laying out bond, dry
f. Laying 1st course, using line
g. Continue laying to lintel height
h. Laying out remaining courses to top
i. Continuing laying to top of wall

Provide Demonstration On:

a. Laying out bond
b. Laying brick to firebox edge
c. Proper slushing of joints

Provide Practical Application On:

Have student face fireplace using standard brick.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. Ray
c. B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

CLASSROOM HOURS 2

EVALUATION (M-61)

a. Given brick, mortar and mason tools, the student will lay brick for the face of a fireplace. The brick should be laid plumb, level, straight and tied and flushed to chimney to prevent fire.

b. B.I.A., Bricklaying III

c. Dalzell and Townsend, Bricklaying Skill and Practice

TASK

M-62 Building a hearth

PERFORMANCE OBJECTIVE

Lay brick to build a hearth.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Sizes and shapes of hearths
b. Kinds of material for filling
c. Layout work

Provide Demonstration On:

a. Laying out hearth
b. Proper bonding
c. Finishing top of hearth

Provide Practical Application On:

Have student build a hearth.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Dalzell and Townsend
b. Ray
c. B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

A/Vs:

B.I.A., "Fireplace Construction"

CLASSROOM HOURS 3

EVALUATION (M-62)

Given brick, mortar and necessary tools, the student will be able to lay out and build a hearth for a fireplace. The work will be level, plumb and straight. The hearth will be even with firebox floor.

TASK

M-63 Building single flue chimney

PERFORMANCE OBJECTIVE

Build a single flue chimney.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Proper installation of thimble
b. Safety

Provide Demonstration On:

a. Cutting hole in flue liner
b. Installing thimble

Provide Practical Application On:

Have student build a single flue chimney.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Ray
b. B.I.A.

Student Manuals:

B.I.A., Project 15

Tools and Equipment:

a. Mason tool bag
b. Thimble
c. Clean-out door
d. Brick and mortar

CLASSROOM HOURS

2

EVALUATION (M-63)

Provided with clean-out door, thimble, flue liners, tools, brick and mortar, the student will construct a single flue chimney. The thimble will not project past inside of flue liner. All work will be square, level and plumb.

TASK

M-64 Building bar-b-que pit

PERFORMANCE OBJECTIVE

Lay out and construct a bar-b-que pit.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Desirable locations for bar-b-que pits
b. Locating site
c. Excavating
d. Pouring slab for base
e. Laying out 1st course
f. Laying next two courses
g. Corbel sides of 4th course, 3/4" to the inside
h. Setting 5th course in line with 3rd course
i. Corbeling sides of 6th course same as 4th course
j. Laying 7th and 8th courses in line with 5th course
k. Setting steel rods on top of 8th course
l. Laying remaining courses
m. Striking joints and brush all work

Provide Demonstration On:

a. Method of layout
b. Placing steel rods
c. Corbeling

Provide Practical Application On:

Have student layout and build a bar-b-que pit.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Steel rods
c. Brick
d. Mortar

CLASSROOM HOURS 1

EVALUATION (M-64)

a. Given mason tools, steel rods, brick and mortar, the student will layout and construct a bar-b-que pit. Work will be square, plumb, level, straight and rods will be spaced on 2" centers.

b. B.I.A., Bricklaying III

TASK

M-65 Installing heatilator

PERFORMANCE OBJECTIVE

Install a heatilator.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Design of unit
b. Advantages of unit
c. Components of unit
d. Purpose of insulation

Provide Demonstration On:

a. Positioning the unit
b. Installation of grilles
c. Installing insulation
d. Proper method of laying brick to enclose unit

Provide Practical Application On:

Have student install a heatilator.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Tools and Equipment:

a. Mason tool bag
b. Heatilator
c. Brick
d. Mortar
e. Insulation

CLASSROOM HOURS

2

EVALUATION (M-65)

a. Given a heatilator unit, necessary tools and supplies, the student will enclose the heatilator. Insulation must completly cover unit with masonry work without touching unit. All work must be square, plumb, level and straight.

b. Performance Guide, V'TECS, p. 66

TASK

M-66 Building diamond pattern

PERFORMANCE OBJECTIVE

Layout and build a diamond pattern wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of pattern walls
b. Importance of workmanship

Provide Demonstration On:

a. Layout of diamond pattern
b. Laying out bond dry
c. Procedure for laying diamond patterns

Provide Practical Application On:

Have student build a panel in the diamond pattern.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Student Manuals:

B. I. A., Project 24

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

CLASSROOM HOURS 1

EVALUATION (M-66)

a. Given necessary tools, light and dark colored brick and mortar, the student will lay a panel in the diamond pattern. The wall must be laid on six or four to eleven with closers occuring every fourth course when opening the diamond and stretchers occuring every fourth course when closing the diamond. The wall must be level, plumb, straight-edged, ranged, pointed and free of cracks and holes.

b. Performance Guide, V'TECS, p. 40

c. Procedure Steps, B. I. A. Project Sheet 24

TASK

M-67 Laying a basket weave pattern

PERFORMANCE OBJECTIVE

Layout and build a basket weave pattern.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of pattern bonds
b. Importance of workmanship
c. Preparing area
d. Jointing and pointing brick

Provide Demonstration On:

a. Layout of basket weave bond
b. Checking pattern

Provide Practical Application On:

Have student layout and build a panel in the basket weave bond.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Student Manuals:

B. I. A., Projects 26 and 27

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar

CLASSROOM HOURS 1

EVALUATION (M-67)

a. Provided with tools, brick and mortar, the student will build a panel in the basket weave bond. The brick must be laid on the No. 6 on a brick spacing rule. Vertical and horizontal joints must be straight.

b. Performance Guide, V'TECS, p. 38

c. Procedure Steps, B. I. A. Project Sheets 26 and 27

TASK

M-68 Building a herringbone weave bond

PERFORMANCE OBJECTIVE

Layout and build a herringbone weave bond.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of pattern bonds
b. Importance of workmanship
c. Leveling whole brick on corners

Provide Demonstration On:

a. Layout of herringbone weave bond
b. Drybonding the pattern
c. Squaring dimensions of the desired pattern area

Provide Practical Application On:

Have student layout and build a panel in the herringbone weave bond.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Student Manuals:

B. I. A., Projects 28 and 29

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar
d. Masonry saw

CLASSROOM HOURS 1

EVALUATION (M-68)

a. Provided with mason tool bag, brick and mortar, the student will layout, cut proper pieces and build a panel in the herringbone weave bond. All brick in the pattern must be laid at a 45° angle.

b. Performance Guide, V'TECS, p. 43

c. Procedure Steps, B. I. A. Project Sheets 28 and 29

TASK

M-69 Cutting and laying mitre blocks

PERFORMANCE OBJECTIVE

Layout and build panel using mitre blocks.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of ornamental work
b. Cutting the angle

Provide Demonstration On:

a. Cutting mitre
b. Finishing the mitre block by laying up the longest cuts
c. Forming a square block 8" x 8"

Provide Practical Application On:

Have student lay panel.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Student Manuals:

B. I. A., Project 30

Tools and Equipment:

a. Mason tool bag
b. Masonry saw
c. Brick
d. Mortar

CLASSROOM HOURS 1

EVALUATION (M-69)

a. Given tools, brick and mortar, the student will lay out panel, cut brick and lay brick to construct a mitre block panel. Work must be straight, level and plumb.

b. Procedure Steps, B.I.A. Project Sheet 30

TASK

M-70 Building a jack arch

PERFORMANCE OBJECTIVE

Cut and build a jack arch.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Special problems in building
b. Types of archs
c. Parts of arch
d. Layout of arches

Provide Demonstration On:

a. Cutting brick for soffit
b. Layout work

Provide Practical Application On:

Have student cut brick and lay a jack arch.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Student Manuals:

B. I. A. Project 19

Tools and Equipment:

a. Mason tool bag
b. Masonry saw
c. Brick and mortar
d. Angle iron

CLASSROOM HOURS 1

EVALUATION (M-70)

Given mason tools and materials, the student will lay out, cut and lay brick for a jack arch. The work should be straight, level and plumb. The soffit of the arch should be cut straight.

TASK

M-71 Building a segmental arch

PERFORMANCE OBJECTIVE

Build a segmental arch.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of arches
b. Uses of arches
c. Names of parts

Provide Demonstration On:

a. Lay out
b. Cutting skewback
c. Cutting creepers

Provide Practical Application On:

Have student build a segmental arch.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Tools and Equipment:

a. Mason tool bag
b. Temporary center
c. Brick and mortar
d. Masonry saw

CLASSROOM HOURS 1

EVALUATION

(M-71)

Given tools, temporary center and materials, the student will lay out and build a segmental arch. The brick in the arch must fit tightly against temporary center. The work should be plumb.

TASK

M-72 Building soldier arch

PERFORMANCE OBJECTIVE

Build a soldier arch.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of arch
b. Weakness of arch
c. Locating arch form
d. Using creepers

Provide Demonstration On:

a. Drybonding bricks
b. Laying soldier course around form
c. Cutting and placing creepers
d. Placing and bracing form

Provide Practical Application On:

Have student build a soldier arch.

INSTRUCTIONAL MATERIALS

Textbooks:

B. I. A.

Student Manual:

B. I. A., Project 20

Tools and Equipment:

a. Mason tool bag
b. Brick
c. Mortar
d. Angle iron

CLASSROOM HOURS 1

EVALUATION (M-72)

Given necessary tools and materials, the student will build a soldier arch. The wall must not crack when wood center is released. The soldier arch must be in line with face of wall and bed joints must be uniform around the arch. The bottom of the arch (soffit) must be flush and free of holes and stretcher course across the top of the arch must not be interrupted by arch height or cuts in the wall.

TASK

M-73 Laying glass blocks

PERFORMANCE OBJECTIVE

Lay glass blocks.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Uses of glass blocks
b. Precautions in handling
c. Expansion joints
d. Wall ties

Provide Demonstration On:

a. Installing expansion joint
b. Methods of laying

Provide Practical Application On:

Have student lay glass blocks.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Rubber tip for trowel handle
c. Glass block
d. Mortar

CLASSROOM HOURS 2

EVALUATION (M-73)

a. Given tools and materials, the student will lay glass blocks. Work must be straight, plumb and level. The expansion joint must be properly installed around the perimeter.

b. Performance Guide, V'TECS, p. 85

TASK

M-74 Laying walks and floors

PERFORMANCE OBJECTIVE

Lay masonry walks and floors.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Special precautions
b. Different patterns
c. Ways of construction

Provide Demonstration On:

a. Mortar joint paving
b. Drybonding from center brick to opposite sides
c. Spreading grout

Provide Practical Application On:

a. Have student lay out and install a walk or floor made of brick.
b. Grout all joints full.

INSTRUCTIONAL MATERIALS

Textbooks:

a. B.I.A.
b. Dalzell and Townsend

Student Manuals:

B.I.A. Projects 25 and 26

Tools and Equipment:

a. Mason tool bag
b. Paving brick
c. Mortar

CLASSROOM HOURS 2

EVALUATION (M-74)

a. Given tools, mortar and paving brick, the student will lay paving brick. The surface of the brick must be level with all of the holes and joints pointed and jointed to shed water.

b. Performance Guide, V'TECS, pp 86-7

TASK

M-75 Building planters

PERFORMANCE OBJECTIVE

Lay out and build planters.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Use of weep holes
b. Placing of weep holes
c. Layout of planters
d. Kinds and shapes of planters

Provide Demonstration On:

a. Keeping weep holes clear of mortar
b. Lay out work
c. Digging and pouring footings
d. Drybonding bricks where planter is to be built

Provide Practical Application On:

Have student construct planter and finish face wall according to joint desired.

INSTRUCTIONAL MATERIALS

Textbook:

B.I.A.

Tools and Equipment:

a. Mason tool bag
b. Brick

CLASSROOM HOURS 2

EVALUATION (M-75)

a. Given tools and supplies, the student will lay out and construct a planter. All weep holes must be kept clear of mortar. The planter must be straight, level, square and plumb.

b. Performance Guide, V'TECS, p. 83

TASK

M-76 Building garden walls

PERFORMANCE OBJECTIVE

Lay out and build a garden wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Design of wall
b. Type of brick to use
c. Types of coping
d. Laying out bond dry in proper bond
e. Building corner leads
f. Attaching line
g. Filling in remaining courses
h. Striking all joints

Provide Demonstration On:

Layout of a wall

Provide Practical Application On:

Have student layout and build one design of a garden wall.

INSTRUCTIONAL MATERIALS

Textbooks:

B.I.A.

A/V:

B.I.A., "Brick in Landscape Design"

Tools and Equipment:

a. Mason tool bag
b. Brick and mortar

CLASSROOM HOURS

1

EVALUATION (M-76)

a. Provided with mason tools, brick and mortar, the student will build a garden wall with a brick cap. The cap must be laid with full joints and pointed up so as to shed water.

b. B.I.A., Bricklaying Vocational Training

TASK

C-01 Reading a rule

PERFORMANCE OBJECTIVE

Measure and use measurement devices to measure and layout.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying increments of an inch
b. Identifying measurement devices
c. Recognizing fractions
d. Adding and subtracting
e. Reading specific measurements
f. Measuring with a rule
g. Identifying the major parts of a framing square
h. Measuring with a framing square

Provide Demonstration On:

a. Adding and subtracting fractions
b. Measuring with a rule
c. Measuring with a framing square

Provide Practical Application On:

a. Identifying increments of an inch
b. Adding and subtracting fractions
c. Measuring with a rule
d. Measuring with a framing square

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

Student Manuals:

Georgia, Units ML 1a and 2

Tools and Materials:

a. Rule
b. Framing square

CLASSROOM HOURS 10

EVALUATION (C-01)

Given a rule and framing square, the student will identify all 1/16" measurements with 100% accuracy.

TASK

C-02 Reading a scale

PERFORMANCE OBJECTIVE

Read a scale.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying types of architect's scale
b. Identifying and listing scales on architect's scale
c. Scaling with architect's scale

Provide Demonstration On:

Using an architect's scale

Provide Practical Application On:

Scaling lines

INSTRUCTIONAL MATERIALS

Textbooks:

a. Feirer and Hutchings
b. Sundberg
c. Wagner

A/Vs:

Dorsett

Student Manuals:

Georgia, Unit BR-1

Tools and Equipment:

a. Architectural scale
b. Paper
c. Pencils

CLASSROOM HOURS

4

EVALUATION (C-02)

Given lines of different lengths and an architect's scale, the student will measure the length of each line. Each line will be to the correct scale and length.

TASK

C-03 Reading orthographic drawings

PERFORMANCE OBJECTIVE

Read orthographic drawings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Recognizing the principles of orthographic drawing
b. Idenyifying the views in an orthographic drawing
c. Matching orthographic views to a pictorial drawing

Provide Demonstration On:

Reading orthographic drawings

Provide Practical Application On:

Reading orthographic drawings

INSTRUCTIONAL MATERIALS

Textbooks:

a. Feirer and Hutchings
b. Sundberg
c. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Foundations"

Student Manuals:

Georgia, Unit BR-2

Tools and Equipment:

Blueprints

CLASSROOM HOURS

2

EVALUATION (C-03)

Given questions on orthographic drawings, the student will answer questions with 80% accuracy.

TASK

C-04 Identifying elevations

PERFORMANCE OBJECTIVE

Identify different elevations and secure basic information from a set of elevations.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying different elevation views of a drawing
b Identifying needed details from a drawing elevation

Provide Demonstration On:

a. Identifying different elevation views of a drawing
b. Sketching elevation views
c. Listing and identifying needed drawing details from an elevation

Provide Practical Application On:

Identifying different elevations and securing basic information from a set elevations

INSTRUCTIONAL MATERIALS

Textbooks:

a. Feirer and Hutchings
b. Sundberg
c. Wagner

Student Manuals:

Georgia, Unit BR-3

Tools and Equipment:

Blueprints

CLASSROOM HOURS

2

EVALUATION (C-04)

Given house elevations, the student will secure basic building information. All details will be identified with 100% accuracy.

TASK

C-05 Identifying symbols

PERFORMANCE OBJECTIVE

Identify various symbols or notations related to building parts and materials and designate specific components and dimensions of the house from the floor plan.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Recognizing principles of symbol representation
b. Identifying symbols from floor plans
c. Identifying drawing notations related to building parts and materials
d. Determining basic information from floor plan drawings
e. Listing specific details from floor plans
f. Reading a floor plan drawing for needed dimensions
g. Listing dimensions from a floor plan

Provide Demonstration On:

Interpreting symbols

Provide Practical Application On:

Interpreting symbols

INSTRUCTIONAL MATERIALS

Textbooks:

a. Feirer and Hutchings
b. Sundberg
c. Wagner

A/Vs:

Dorsett

Student Manuals:

Georgia, Unit BR 4-6

Tools and Materials:

Blueprints

CLASSROOM HOURS

2

EVALUATION (C-05)

Given blueprints, the student will identify various symbols or notations related to building parts and materials and designate specific components and dimensions of the house with 80% accuracy.

TASK

C-06 Identifying structural details from a cross section of a house

PERFORMANCE OBJECTIVE

Identify specific structural details from a cross section of a house.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Recognizing the principles of cross sectioning as used in architectural drawings
b. Locating needed details on a cross section drawing
c. Listing specific structural details from a cross section drawing
d. Recognizing the meaning of architectural detail drawings
e. Locating needed information from the details
f. Listing specific information from a set of architectural details

Provide Demonstration On:

Identifying structural details from a cross section of a house

Provide Practical Application On:

Identifying specific structural details from a cross section of a house

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Sundberg
e. Wagner

A/Vs:

Dorsett

Student manuals:

Georgia, Unit BR-7

Tools and Equipment:

Blueprints

CLASSROOM HOURS

1

EVALUATION (C-06)

Given a cross section of house, the student will identify specific structural details with 80% accuracy.

TASK

C-.07 Determining information from plot plans

PERFORMANCE OBJECTIVE

Determine various information and dimensions from a plot plan.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Using plot plans
b. Recognizing principles of plot plan drawings
c. Determining various information from a plot plan
d. Identifying dimensions from a plot plan drawing

Provide Demonstration On:

a. Determining various information from a plot plan
b. Identifying dimensions from a plot plan drawing

Provide Practical Application On:

Determining various information and dimensions from a plot plan

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c.. Sundberg
d. Wagner

A/Vs:

Dorsett

Student Manuals:

Georgia, Unit BR-9

Tools and Equipment:

Plot plans

CLASSROOM HOURS

1

EVALUATION (C-07)

Given plot plans, the student will determine various information and identify dimensions to the instructor's satisfaction.

TASK

C-08 Building a sawhorse

PERFORMANCE OBJECTIVE

Build a sawhorse.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Selection of tools and lumber
b. Using framing square to layout legs
c. Measuring, laying out and marking
d. Cutting with a cross-cut saw
e. Recognizing nail sizes and types
f. Trimming with wood rasp

Provide Demonstration On:

a. Using framing square to layout legs
b. Measuring, laying out and marking
c. Cutting with a cross-cut saw
d. Trimming with wood rasp

Provide Practical Application On:

Assembling the sawhorse

INSTRUCTIONAL MATERIALS

Student Manuals:

Georgia, Unit BSH 1 through 4

Tools and Equipment:

a. Tool kit
b. 2 x 4
c. 1 x 4
d. Plywood
e. Nails

CLASSROOM HOURS 20

EVALUATION (C-08)

Given plans and specifications, the student will layout, cut and assemble a sawhorse in 10 hours of shop work.

TASK

C-09 Installing sills and floor joist

PERFORMANCE OBJECTIVE

Layout, saw and install sills, floor joist and joist headers on a house.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Selecting lumber for house
b. Computing safe load for spans
c. Computing number of floor joists
d. Recognizing the use of anchor bolts
e. Assembling headers
f. Laying out and fastening joist on 16" centers

Provide Demonstration On:

a. Assembling headers
b. Laying out and fastening joist

Provide Practical Application On:

Sawing and installing sills and floor joist

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Floor and Wall Framing"
c. DCA, "Foundation and Floor Framing"

Student Manuals:

Georgia, Unit SMH-1

Tools and Equipment:

a. Tool kit
b. Framing lumber
c. Anchor bolts

CLASSROOM HOURS

6

EVALUATION (C-09)

Given building plans and specifications, the student will lay-out, cut and install sills and floor joist on a house. Material must be cut and joined within one-fourth inch. All work must be completed in accordance with specifications and plans furnished.

TASK

C-10 Installing floor decking

PERFORMANCE OBJECTIVE

Cut and install decking as a subfloor in a house.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Different types of subflooring
b. Computing square footage
c. Lining up subfloor from edge of header flush with perimeter, longways across joists
d. Determining that all joists are staggered and meeting together on top of joist half and half
e. Fastening plywood to subfloor
f. Cutting excess subfloor from edge

Provide Demonstration On:

a. Lining up subfloor from edge of header
b. Staggering plywood sheets so that no two ends rest on the same joist
c. Fastening plywood to subfloor
d. Cutting excess subfloor

Provide Practical Application On:

Installing decking in a house

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Floor and Wall Framing"
c. DCA, "Foundation and Floor Framing"

Student Manuals:

Georgia, Unit SMH-2

Tools and Equipment:

a. Tool kit
b. Plywood

CLASSROOM HOURS 6

EVALUATION (C-10)

Given building plans and specifications, the student will cut and install decking in a house as a subfloor withing time limits designated as acceptable by industry requirements.

TASK

C-11 Laying out, sawing and assembling exterior frame wall

PERFORMANCE OBJECTIVE

Layout, saw and assemble an exterior frame wall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Marking to length and cutting sole plates and top plates
b. Laying out, cutting and squaring studs 16" on center, marking off windows and door openings
c. Purpose of corner posts and T-posts
d. Assembling corner posts and T-posts
e. Installing corners, T's, doors and windows
f. Size of nails to be used

Provide Demonstration On:

a. How to measure and cut sole plates and top plates
b. How to layout, cut and square studs 16" on center and how to mark off door and window openings
c. How to assemble corner posts and T-posts
d. How to install corners, T's, doors and windows

Provide Practical Application On:

a. Cut and layout bottom and top plates

(continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Floor and Wall Framing"
c. DCA, "Building Construction Exterior"

Student Manuals:

Georgia, Unit SMH-4

Tools and Equipment:

a. Tool kit
b. Framing lumber
c. Nails

CLASSROOM HOURS 6

EVALUATION (C-11)

Given a previously built foundation, working drawings and specifications, necessary framing lumber and carpenter tools, the student will layout, frame and align a section of exterior wall that includes a window and door opening and an interior partition. The following standards will apply:

Plates will be marked to receive framing members (exact location ± one-sixteenths of an inch)
Walls will be cut to the specified length (± one-sixteenths of an inch)
Framing members will be positioned and nailed according to FHA specifications

INSTRUCTIONAL ACTIVITIES

Provide Practical Application On:

b. Nail top and bottom plates to end of studs
c. Place wall opening assemblies in position and nail to top and bottom plates
d. Place and nail corners and T's to plates
e. Raise and secure wall section to subfloor

TASK

C-12 Laying out, sawing and framing windows and doors

PERFORMANCE OBJECTIVE

Layout, saw and frame windows and doors according to rough-in dimensions.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of doors and windows
b. Determining rough openings
c. Purpose of a header
d. Measuring and cutting header length
e. Materials used in building header
f. Identifying trimmer, rough sill, and cripple studs

Provide Demonstration On:

a. Building a header
b. Cutting and installing trimmer
c. Cutting and installing rough sill and cripple studs

Provide Practical Application On:

a. Building a header
b. Cutting and installing trimmer
c. Cutting and installing rough sill and cripple studs

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Completing the Exterior"
c. DCA "Building Construction Exterior"

Student Manuals:

Georgia, Unit SMH-3

Tools and Equipment:

a. Tool kit
b. 2 x 10
c. 2 x 4

CLASSROOM HOURS 6

EVALUATION (C-12)

Given building plans and specifications, the student will lay-out, saw and frame windows and doors according to rough-in dimensions. All work must be in accordance with manufacturer's specifications. Material must be cut and joined with one-fourth inch.

TASK

C-13 Laying out, cutting and installing weatherboard

PERFORMANCE OBJECTIVE

Layout, cut and install weatherboard on a house.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of weatherboard
b. Cutting and assembling cornerboard
c. Nailing cornerboards to house
d. Laying out and installing exterior jams around doors and windows
e. Nailing weatherboards to lap for weather protection

Provide Demonstration On:

a. Techniques for cutting and assembling cornerboards
b. How to nail cornerboards and weatherboards
c. How to layout and install jams

Provide Practical Application On:

Cutting, assembling and installing weatherboad

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Durbahn
c. Capotosto
d. Masonite Exterior Hardboard

A/Vs:

a. McGraw-Hill, "Siding Sense"
b. 3M Company, "Carpentry Exterior Trim"
c. Prentice-Hall, "Completing the Exterior"

Student Manuals:

Georgia, Unit SMH-9

Tools and Equipment:

a. Tool kit
b. Weatherboard

CLASSROOM HOURS 4

EVALUATION (C-13)

Given building plans and specifications, the student will layout, cut and install weatherboard on a house. All work must be completed in accordance with specifications and plans furnished. Material must be cut and joined within one-eighth inch. Work must also be square, plumb, level, securely fastened and completed within professionally accepted time standards for the designated job.

TASK

C-14 Laying out and framing a stairwell opening

PERFORMANCE OBJECTIVE

Layout and frame a stairwell opening according to specifications.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Determining rough opening size and location of stairwell from working drawings
b. Laying off girders and sills for placement of trimmers
c. Cutting trimmers to length and installing trimmers
d. Determing length of headers
e. Nailing headers
f. Doubting (or tripling) headers and trimmers as required

Provide Practical Application On:

Laying out and framing a stairwell opening

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

A/Vs:

Prentice-Hall Media, "Installing Floor Joists and Subflooring"

Student Manuals:

a. Georgia, Unit STC-1
b. Georgia, Unit STC-2

Tools and Equipment:

a. Tool kit
b. 2 X 4 framing material
c. 2 X 6 framing material
d. Nails

CLASSROOM HOURS

4

EVALUATION (C-14)

Given working drawings, specifications, necessary tools, equipment and sufficient materials, the student will frame a stairwell opening according to specifications. The following standards will apply:

1. Trimmer joists will be cut to specified length (± one-sixteenth inch).
2. Studs will project beyond the inside face of the trimmer.
3. Headers will be correctly fastened to trimmer joists.
4. The number of trimmers and headers will be in agreement with specifications.
5. All stairwell framing members will be properly aligned.

TASK

C-15 Constructing stairs

PERFORMANCE OBJECTIVE

Compute layout for and build stairs.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying stair parts and dimensions
b. Types of stairs (open, closed, straight run, etc.)
c. Selecting lumber for project
d. Determining and computing rise and tread dimensions
e. Tools used in constructing stairs
f. Laying out with framing square
g. Sawing the stringer, risers and treads
h. Assemble stairs

Provide Demonstration On:

a. Computing and determining the rise and tread dimensions
b. How to layout stairs with a framing square
c. Assembling the stairs

Provide Practical Application On:

a. Computing and determining the rise and tread dimensions
b. How to layout stairs with a framing square
c. Assembling stairs

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Feirer and Hutchings
c. Rebaud
d. Douglas and Werner

A/Vs:

a. Dorsett
b. DCA, "Building Construction Exterior"

Student Manuals:

a. Georgia, Unit STC-1
b. Georgia, Unit STC-2

Tools and Equipment:

a. Tool kit
b. 2 x 12
c. 1 x 10

CLASSROOM HOURS 8

EVALUATION (C-15)

Given building plans and specifications, the student will compute, layout, cut and install the indicated staircase. All work must be completed in accordance with specifications and plans furnished. Material must be cut and joined within one-eighth inch. Work must also be square, level, securely fastened and completed within reasonably accepted time standards for the designated job.

TASK

C-16 Cutting and installing ceiling joist

PERFORMANCE OBJECTIVE

Layout, cut and install ceiling joist.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Selecting lumber for project
b. Layout of joist
c. Computing number of joists needed
d. Cutting the ceiling joist ends to the slope of roof

Provide Demonstration On:

a. Laying out and marking distances between joist on wallplate
b. Cutting the ceiling joist ends to roof surface
c. Measuring and sawing ceiling joist to correct length per span
d. Installing ceiling joists to plates

Provide Practical Application On:

a. Laying out and marking distances between joist on wallplate
b. Cutting the ceiling joist ends to roof surface
c. Measuring and sawing ceiling joist to correct length per span
d. Installing ceiling joists to plates

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. DCA, "Building Construction Exterior"

Student Manuals:

Georgia, Unit SMH-5

Tools and Equipment:

a. Tool kit
b. Framing lumber

CLASSROOM HOURS 4

EVALUATION (C-16)

Given working drawings, specifications and necessary tools, equipment and materials the student will layout, cut and install ceiling joist. All items on the instructor's checklist must be completed and must meet standards designated as acceptable by the instructor.

TASK

C-17 Identifying parts of a roof

PERFORMANCE OBJECTIVE

Identify the components of a roof, types of rafters, types of roofs and their uses.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Components of roof systems
b. Types of roofs
c. Purpose of roof types
d. Types of rafters
e. Use of rafters
f. Parts of a rafter

Provide Demonstration On:

a. Recognizing roof components
b. Recognizing parts of a rafter

Provide Practical Application On:

Identifying parts of a roof

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Roofing"
c. DCA, "Building Construction Exterior"

Student Manuals:

Georgia, Unit SMH-6a-d

Tools and Equipment:

Illustrations

CLASSROOM HOURS

2

EVALUATION (C-17)

Given drawings of roof systems, the student will identify components of a roof, types of rafters, types of roofs and their uses. All work must be completed with 80% accuracy.

TASK

C-18 Laying out, cutting and erecting common rafters as required to build a gable roof

PERFORMANCE OBJECTIVE

Layout, cut and erect common rafters as required to build a gable roof.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of rafter layout
b. Procedure to use step-off method to layout correct length and cuts on pattern rafter
c. Cutting the rafter

Provide Demonstration On:

a. Procedure to use step-off method
b. Laying out gable rafters
c. Checking step-off work with computations from framing square (unit rise)
d. Cutting and installing rafters
e. Installing barge rafters and roof rakes

Provide Practical Application On:

Laying out, cutting and erecting common rafters as required to build a gable roof

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Sundberg
e. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Roofing"
c. DCA, "Building Construction Exterior"

Student Manuals:

Georgia, Unit SMH-6e

Tools and Equipment:

a. Tool kit
b. Framing lumber

CLASSROOM HOURS 8

EVALUATION (C-18)

Given building plans and specifications, the student will layout, cut and erect common rafters as required to build a gable roof. All items on the instructor's checklist must be completed and must meet standards designated as acceptable by the instructer.

Checklist

Common Rafters	Acceptable	Unacceptable
1. Calculated unit rise for common rafter	________	________
2. Determine unit length for common rafter	________	________
3. Accurately cut rafters	________	________
4. Accurately erected rafter	________	________

TASK

C-19 Installing a gambrel roof

PERFORMANCE OBJECTIVE

Layout, cut and install a gambrel roof.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Principles of gambrel roof construction
b. Procedures to build gambrel roof
c. Computing heights for upper storage
d. Determining bottom section rafter pitch
e. Computing plumb and seat cuts for bottom section rafter
f. Computing and determining top rafter rise and run for pitch

Provide Demonstration On:

a. Constructing, bracing and nailing stud wall into position at designated location
b. Computing height of ceiling joist into existing heights for upper storage
c. Determining bottom section rafter pitch
d. Cutting rafters to size
e. Computing top section, rafter rise and run for pitch
f. Determining seat and plumb
g. Nailing rafters

(continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

A/Vs:

a. Audio Active
b. Dorsett

Student Manuals:

Georgia, Unit RD-1

Tools and Equipment:

a. Tool kit
b. 2 x 4 or 2 x 6 framing material

CLASSROOM HOURS 8

EVALUATION (C-19)

Given tools, materials and a scale model building, the student will layout, cut and install a gambrel roof. All work must be in accordance with the instructor's specifications.

INSTRUCTIONAL ACTIVITIES (continued)

Provide Practical Application On:

Laying out, cutting and installing a gambrel roof.

TASK

C-20 Installing a hip roof

PERFORMANCE OBJECTIVE

Layout, cut and install a hip roof.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Recognizing components of a hip style roof
b. Laying out and cutting common rafters and ridge
c. Laying out and cutting both end common rafters
d. Checking layout measurement by framing square rafter table
e. Laying out seat and bird mouth cuts on hip rafter
f. Determining hip jack lengths by computing the common difference
g. Cutting and installing hip jack rafters into the roof

Provide Demonstration On:

a. Laying out and cutting common rafters and ridge
b. Assembling and nailing common rafters into ridge
c. Nailing end common rafters into roof
d. Laying out and marking hip rafter length
e. Checking layout measurement by framing square rafter table
f. Laying out seat and bird mouth cuts on hip rafter
g. Cutting hip rafter length seat and bird mouth
h. Installing hip rafters

(continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

Student Manuals:

Georgia, Unit RD-3

Tools and Equipment:

a. Tool kit
b. 2 x 6 framing material

CLASSROOM HOURS 8

EVALUATION (C-20)

Given tools, materials and a scale model building, the student will cut and install a gambrel roof. All work must be in accordance with instructor's specifications.

INSTRUCTIONAL ACTIVITIES (continued)

Provide Demonstration On:

i. Laying out jack rafters
j. Determining hip rafter length by computing common difference

Provide Practical Application On:

Laying out, cutting and installing a hip roof

TASK

C-21 Installing roof decking and applying felt underlayment

PERFORMANCE OBJECTIVE

Install ½" plywood roof decking and apply felt underlayment to the roof surface.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Selecting decking material
b. Laying plywood sheets with one inch overhanging eaves and gable ends
c. Fastening plywood to rafters
d. Applying felt paper

Provide Demonstration On:

a. Laying plywood sheets with one inch overhang
b. Fastening plywood
c. Applying felt paper

Provide Practical Application On:

Installing ½" plywood roof decking and applying felt underlayment to the roof surface

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Roofing"
c. DCA, "Building Construction Exterior"

Student Manuals:

Georgia, Unit SMH-7

Tools and Equipment:

a. Tool kit
b. Plywood
c. 15 lb. felt

CLASSROOM HOURS 4

EVALUATION (C-21)

Given a previously built roof, the student will install roof decking and apply felt underlayment to the roof surface. Work must be completed within time limits designated as acceptable by industry requirements.

TASK

C-22 Laying out asphalt composition shingles

PERFORMANCE OBJECTIVE

Layout asphalt composition shingles.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying materials needed for roof shingling
b. Chalking lines
c. Reversing and installing bottom first course of shingles
d. Chalking additional vertical and horizontal lines

Provide Demonstration On:

a. Measuring and chalking horizontal and vertical lines
b. Applying bottom course and starter row
c. Applying shingles

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. Prentice-Hall, "Roofing"
c. DCA, "Building Construction Exterior"

Student Manuals:

Georgia, Units SMH 8a and b

Tools and Equipment

a. Tool kit
b. Shingles
c. Roofing nails
d. Roof

CLASSROOM HOURS 6

EVALUATION (C-22)

Given a previously built roof, the student will layout asphalt composition shingles. All work must meet shingle specification requirements.

TASK

C-23 Framing a roof opening for a chimney

PERFORMANCE OBJECTIVE

Frame a roof opening for a chimney according to specifications and with the assistance of a helper.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Laying out and cutting frame opening after regular roof rafters are installed
b. Plumbing the opening
c. Laying out opening width
d. Nailing temporary strip across opening and cutting the rafters
e. Installing double headers both top and bottom
f. Laying out the two corresponding sides of headers
g. Cutting and installing cripple rafters to each side
h. Cutting and installing trimmer rafters
i. Checking measurements of opening
j. Southern Building Code requirements for chimney clearance

Provide Practical Application On:

Framing a roof opening for a chimney according to specifications with a helper

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

A/Vs:

Prentice-Hall Media, "Roofing"

Tools and Equipment:

a. Tool kit
b. 2 X 4 framing material
c. Nails

CLASSROOM HOURS

6

EVALUATION (C-23)

Given a roof with rafters previously installed, working drawings, a helper and all necessary tools and supplies, the student will layout, cut and frame the opening according to specifications.

TASK

C-24 Building a porch cornice

PERFORMANCE OBJECTIVE

Build a porch cornice on a porch which has been previously rough framed.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Porch cornice style (matching style to main building cornice)
b. Checking plans
    1. Type of construction
    2. Materials
    3. Details and dimensions
c. Supporting framework
d. Furring the side of the girders
e. Selecting boards and cutting them
f. Nailing boards in place
g. Cutting and installing molding as required

Provide Practical Application On:

Building a porch cornice to specifications

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

A/Vs:

Prentice-Hall Media, "Roofing"

Tools and Equipment:

a. Tool kit
b. Nails
c. Furring strips
d. Appropriate size boards

CLASSROOM HOURS 4

EVALUATION (C-24)

Given a porch which has been previously framed, plans, tools and materials, the student will build a porch cornice according to specifications.

TASK

C-25 Building a projected box cornice for a brick veneer structure

PERFORMANCE OBJECTIVE

Build a projected box cornice.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Reading and interpreting plans
b. Framing the ceiling joists
c. Installing outside plates
d. Installing flooring on top of joists (if called for by plans)
e. Installing rafters
f. Cutting and fitting plancier board
g. Cutting and fitting fascia board
h. Cutting and installing first run of sheathing boards
i. Cutting, fitting and installing bed

Provide Practical Application On:

Building projected box cornice using a helper

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Weaver
b. Durbahn
c. Rebaud
d. Wagner

A/Vs:

Prentice-Hall Media, "Roofing"

Tools and Equipment:

a. Tool kit
b. Nails
c. Boards as required

CLASSROOM HOURS

4

EVALUATION (C-25)

Given a residential structure to be brick veneered, detailed plans for a projected box cornice, a helper, tools and materials, the student will build a projected box cornice according to specifications.

TASK

C-26 Building a closed box cornice

PERFORMANCE OBJECTIVE

Build a closed box cornice.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Styles of closed box cornices
b. Reading plans to determine dimensions
c. Measuring and cutting required lookout brackets
d. Nailing brackets on end of cornice
e. Chalk line
f. Nailing required brackets to studs and rafter tails (line up to chalk line)
g. Cutting, fitting and nailing plancier board
h. Cutting, fitting and nailing fascia board
i. Cutting, fitting and nailing the frieze board
j. Cutting, fitting and nailing molding
    1. crown molding
    2. bed molding

Provide Practical Application On:

Build a closed box cornice with a helper according to specified plans.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wanger

A/Vs:

Prentice-Hall Media, "Roofing"

Tools and Equipment:

a. Tool kit
b. Boards as required
c. Brackets
d. Nails
e. Chalkline

CLASSROOM HOURS	4

EVALUATION (C-26)

Given a previously framed structure ready to receive a cornice, tools, materials, plans and a helper, the student will build a closed box cornice according to specifications.

TASK

C-27 Installing dormers

PERFORMANCE OBJECTIVE

Frame a gable dormer.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Dormers
  1. gable dormer
  2. shed dormer
b. Framing a dormer
  1. Read plans and determine size of opening
  2. Cutting the ridge board
  3. Cutting and installing common rafters
  4. Cutting and installing valley rafters
  5. Cutting and installing valley jack rafters on dormed and main roof
c. Framing a dormer with side walls
  1. Corner posts
  2. Side wall studs

c. Framing a dormer with side walls
  1. Corner posts
  2. Side wall studs

Provide Practical Application On:

Frame a gable dormer according to specifications.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

A/Vs:

Prentice-Hall Media, "Roofing"

Tools and Equipment:

a. Tool kit
b. 2 x 4 framing materials
c. 2 x 6 framing materials
d. Nails

CLASSROOM HOURS

12

EVALUATION (C-27)

Given plans and dimensions, necessary tools and materials, the student will frame a dormer according to specifications.

TASK

C-28 Installing flashing

PERFORMANCE OBJECTIVE

Flash chimney, roof vents and valleys for asphalt shingles.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

- a. Flashing material
  - 1. Purpose
  - 2. Installation procedures
- b. Flashing chimney and roof vents
  - 1. Chimney saddle
  - 2. Chiseling mortar joints
  - 3. Base and cap
  - 4. Material type for base and cap
  - 5. Sealing joints
  - 6. Counterflashing
  - 7. Filling mortar joints
  - 8. Checking for cracks and holes which may leak
- c. Flashing valleys (for asphalt shingles)
  - 1. Material type
  - 2. Installing first strip
  - 3. Lapping joints between strips
  - 4. Using the chalk line
  - 5. HVD regulations

Provide Practical Application On:

- a. Flashing chimney and roof vents
- b. Flashing valleys for asphalt shingles

INSTRUCTIONAL MATERIALS

Textbooks:

- a. Douglas and Werner
- b. Durbahn
- c. Feirer and Hutchings
- d. Rebaud
- e. Wagner

A/Vs:

Prentice-Hall Media, "Roofing

Tools and Equipment:

- a. Tool kit
- b. Flashing material
- c. Nails

CLASSROOM HOURS 6

EVALUATION (C-28)

a. Given a chimney or vent that extends through a roof structure, necessary tools and materials, the student will flash the chimney or vent. All cracks and holes must be filled in to eliminate leaks.

b. Given a previously decked roof with a valley, necessary tools and materials, the student will flash the valley for asphalt shingle installation. The valley width shall conform to all HVD regulations and should not leak.

TASK

C-29 Installing drywall

PERFORMANCE OBJECTIVE

Layout, cut and install drywall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of drywall
b. Measuring and cutting wallboard
c. Marking and curring wallboard for electrical light boxes
d. Installing wall panels on ceiling and walls

Provide Demonstration On:

a. Measuring and curring wallboard
b. Marking and curring wallboard for electrical light boxes
c. Installing drywall

Provide Practical Application On:

Laying out, cutting, and installing drywall

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Feirer and Hutchings
c. Rebaud
d. Wagner

A/Vs:

a. Dorsett
b. DCA, "Building Construction Interior"

Student Manuals:

Georgia, Unit DI-1

Tools and Equipment

a. Tool kit
b. Drywall
c. Sheetrock nails

CLASSROOM HOURS

3 to 5

EVALUATION (C-29)

Given a previously built wall and ceiling, the student will layout, cut and install drywall. Work must be securely fastened and completed within time limits designated as acceptable by industry requirements.

TASK

C-30 Filling nail holes, taping and floating

PERFORMANCE OBJECTIVE

Use drywall cement to fill nail holes, tape joints and float out the drywall.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying needed tools and materials
b. Filling nail holes
c. Applying tape over joints and floating
d. Sanding cemented areas to smooth contour

Provide Demonstration On:

a. Applying drywall cement over nail holes
b. Spreading drywall cement with 6" broad knife over joints where panels meet
c. Cutting and installing tape over joints
d. Covering tape joints with second layer of drywall cement
e. Sanding cemented areas to smooth contour
f. Repatching and sanding where necessary

Provide Practical Application On:

Filling nail holes, taping joints and floating out the drywall

INSTRUCTIONAL MATERIALS

Textbooks:

a. Feirer and Huchings
b. Wagner

A/Vs:

a. Dorsett
b. DCA, "Building Construction Interior"

Student Manuals:

Georgia, Unit DI 2-3

Tools and Equipment:

a. Utility knife
b. Hawk
c. 6", 10" and 14" trowels
d. Drywall cement
e. Tape
f. Sheetrock
g. Measuring devices
h. T-square

CLASSROOM HOURS 8

EVALUATION (C-30)

Given drywall, the student will fill nail holes, tape joints and float out the drywall. All work must be completed within time limits designated as acceptable by industry requirements.

TASK

C-31 Hanging wallpaper

PERFORMANCE OBJECTIVE

Layout, cut, align and install wallpaper.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying tools and materials
b. Procedures for hanging
c. Types of wallpaper

Provide Demonstration On:

a. Squaring wallpaper
b. Measuring wallpaper
c. Drawing an alignment line from ceiling to floor
d. Submerging wallpaper in water
e. Wiping bubbles from wallpaper with sponge
f. Trimming around facings
g. Installing and matching other wallpaper sheets

Provide Practical Application On:

Laying out, cutting, aligning and installing wallpaper

INSTRUCTIONAL MATERIALS

Textbooks:

Wagner

Student Manuals:

Georgia, Unit DI-6

Tools and Equipment:

a. Wallpaper
b. Water trough
c. Razor knife
d. Framing square
e. Scissors
f. Pencil
g. 4' level

CLASSROOM HOURS

8

EVALUATION (C-31)

Given a painted wall section, the student will layout, cut, align and install wallpaper. All designs must match and continue around the room in the same manner.

TASK

C-32 Painting drywall

PERFORMANCE OBJECTIVE

Paint an interior wall section using water base or oil base paint.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying tools and materials
b. Recognizing the two types of interior drywall paint
c. Thinning paint if necessary
d. Cleaning brushes

Provide Demonstration On:

a. Placing drop cloth
b. Thinning paint if necessary
c. Trimming around doors, windows, etc. with paint brush
d. Painting large areas with roller
e. Cleaning tools

Provide Practical Application On:

Painting an interior wall section

INSTRUCTIONAL MATERIALS

Textbooks:

Wagner

Student Manuals:

Georgia, Unit DI-5

Tools and Equipment:

a. Paint
b. Brushes
c. Rollers
d. Pan
e. Mineral spirits
f. Water
g. Drop cloth

CLASSROOM HOURS

1

EVALUATION (C-32)

Given a drywall section, the student will paint it so there is no sheetrock bleed through. Work must meet instructor's satisfaction.

TASK

C-33 Stippling drywall

PERFORMANCE OBJECTIVE

Stipple finish a drywall ceiling.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying tools and materials
b. Preparing cement
c. Different patterns
d. Applying cement to drywall

Provide Demonstration On:

a. Thinning pre-mixed drywall cement
b. Applying coat of mixture to ceiling with roller
c. Dampening the stipple brush
d. Pressing stipple brush against ceiling until area is covered with desired pattern

Provide Practical Application On:

Stipple finishing a drywall ceiling

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Douglas and Werner

A/Vs:

Dorsett

Student Manuals:

Georgia, Unit DI-4

Tools and Equipment:

a. Paint roller with extension handle
b. Stipple brush with handle
c. Water
d. Sheetrock putty

CLASSROOM HOURS 4

EVALUATION (C-33)

- Given an unfinished drywall ceiling, the student will stipple in a uniform pattern. The desired area must be completely covered with no bleed through.

TASK

C-34 Installing crown molding

PERFORMANCE OBJECTIVE

Install crown molding in a room.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Recognizing sizes and types of crown molding
b. Measuring the wall
c. Scarfing or scribing the crown molding
d. Installing crown molding

Provide Demonstration On:

a. Measuring the first wall
b. Squaring ends of crown molding
c. Scarfing long walls
d. Coping joints where needed
e. Scribing ends
f. Nailing crown molding in place

Provide Practical Application On:

Measuring, cutting and installing crown molding

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Feirer and Hutchings
c. Douglas and Werner

A/Vs:

a. Dorsett
b. Audio Active
c. DCA, "Building Construction Interior"

Student Manuals:

Georgia, Unit IIT-3

Tools and Equipment:

a. Tool kit
b. Coping saw
c. Mitre saw
d. Crown molding

CLASSROOM HOURS

10

EVALUATION (C-34)

Given a wall and ceiling unit, the student will measure, cut and install crown molding. All work must fit snugly with no cracks showing and should be completed within reasonably accepted time standards for the designated job.

TASK

C-35 Installing interior plywood paneling

PERFORMANCE OBJECTIVE

Layout, cut and install interior paneling.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying tools and materials
b. Measuring and marking cutouts for outlets, windows, doors, corners, etc.

Provide Demonstration On:

a. Marking and sawing paneling to size
b. Plumbing paneling
c. Securing paneling with adhesive or nails

Provide Practical Application On:

Laying out, cutting and installing plywood paneling

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Feirer and Hutchings
c. Reband

A/Vs:

a. Dorsett
b. DCA, "Building Construction Interior"

Student Manuals:

Georgia, Unit PAN-1

Tools and Equipment:

a. Tool kit
b. Paneling
c. Adhesive or paneling nails

CLASSROOM HOURS 6

EVALUATION (C-35)

Given a wall unit, the student will layout, cut and install paneling. Paneling will be level and securely joined. All work should be completed within reasonably accepted time standards for the designated job.

TASK

C-36 Installing a pre-hung door

PERFORMANCE OBJECTIVE

Disassemble, install and reassemble a pre-hung door.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying tools and materials
b. Removing crating and disassembling the two sections of pre-hung door
c. Checking door swing for correctness
d. Plumbing and nailing the jamb

Provide Demonstration On:

a. Disassembling two sections of pre-hung door
b. Mounting the hinged door section into rough opening
c. Checking, plumbing and nailing the jamb
d. Squaring top of frame
e. Installing and nailing remaining section into opening

Provide Practical Application On:

Repeat above steps

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Feirer and Hutchings

A/Vs:

Audio Active
Dorsett

Student Manuals:

Georgia, Unit WD-1

Tools and Equipment:

a. Tool kit
b. Pre-hung door

CLASSROOM HOURS

1

EVALUATION (C-36)

Given a rough door opening, the student will disassemble, install and reassemble a pre-hung door unit. All work must be plumb and square with 1/8" maximum clearance between door and jamb with no hammer prints on jamb.

TASK

C-37 Installing a door lock set

PERFORMANCE OBJECTIVE

Install a door lock set by laying out holes, drilling, mortising and assembling the locks.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of door locks
b. Measuring door thickness
c. Marking door with template
d. Setting expansive bit to correct size for hole
e. Drilling hole for door side
f. Selecting bit and drilling hole for strike cylinder hole
g. Laying out and marking front plate
h. Chiseling front plate to 1/8" depth
i. Aligning, marking and drilling latch hole on jamb

Provide Demonstration On:

a. Marking door with template
b. Drilling initial hole in door side
c. Drilling strike cylinder hole to intersect with door hole
d. Laying out and chiseling front plate
e. Aligning and marking position of latch on door jamb
f. Marking around latch plate
g. Chiseling marked area for latch plate
h. Installing lock assembly

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Feirer and Hutchings

Student Manuals:

Georgia, Unit WD-2

Tools and Equipment:

a. Tool kit
b. Door lock set
c. Door

CLASSROOM HOURS

2

EVALUATION (C-37)

Given a door, the student will layout holes, drill, mortise and assemble locks. Work must be in accordance with lock and manufacturer's specifications.

TASK

C-38 Installing a pre-hung window

PERFORMANCE OBJECTIVE

Install a pre-hung window

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Procedure for installing window
b. Checking rough opening dimensions for correctness
c. Placing window unit into position in opening
d. Leveling and plumbing window unit with shims

Provide Demonstration On:

a. Placing window unit into opening
b. Leveling and plumbing window unit with shims
c. Nailing unit into opening with finishing nails

Provide Practical Application On:

Installing pre-hung windows

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Feirer and Hutchings

A/Vs:

a. Audio Active
b. Dorsett
c. Prentice-Hall, "Completing the Exterior"

Student Manuals:

Georgia, Unit WD-3

Tools and Equipment:

a. Tool kit
b. Pre-hung windows

CLASSROOM HOURS

2

EVALUATION (C-38)

Given a window opening, the student will install a pre-hung window. All work must be completed in accordance with manufacturer's specifications. Work must be square, level and securely fastened and completed within reasonably accepted time standards for the designated job.

TASK

C-39 Trimming out a window

PERFORMANCE OBJECTIVE

Trim out the inside of a pre-hung window.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying tools and materials
b. Marking and cutting trim
c. Marking and cutting stool
d. Setting mitre saw on 45°
e. Measuring marking and cutting casing
f. Adjusting and re-sawing casing where necessary
g. Nailing casing onto window

Provide Demonstration On:

a. Marking and cutting stool to fit against sash, jamb wallboard
b. Marking, cutting and nailing apron into position
c. Measuring, marking and casing
d. Nailing casing into position

Provide Practical Application On:

Measure, cut and install trim for a pre-hung window

INSTRUCTIONAL MATERIALS

Textbooks:

a. Wagner
b. Rebaud

A/Vs:

a. Dorsett
b. DCA, "Building Construction Interior"

Student Manuals:

Georgia, Unit IIT-1

Tools and Equipment:

a. Mitre saw
b. Tool kit
c. Casing
d. Window

CLASSROOM HOURS 4

EVALUATION (C-39)

Given a pre-hung window, the student will measure, cut and install all the necessary interior trim including sash, stool, casing and window stock according to instructor's satisfaction. All 45° joints must fit snuggly.

TASK

C-40 Installing base molding

PERFORMANCE OBJECTIVE

Cut and install base molding.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of base molding
b. Choosing type of base molding application
c. Selecting material needed

Provide Demonstration On:

a. Measuring base molding to fit wall
b. Mitring outside corners of base molding
c. Mitring outside corners of base molding
d. Installing base molding

Provide Practical Application On:

Cut and install base molding.

INSTRUCTIONAL MATERIALS

Textbooks

a. Wagner
b. Feirer and Hutchings
c. Douglas and Werner

A/Vs:

a. Dorsett
b. DCA, "Building Construction Interior"

Student Manuals:

Georgia, Unit IIT-2

Tools and Equipment:

a. Mitre saw
b. Tool kit
c. Coping saw
d. Base molding

CLASSROOM HOURS

4

EVALUATION (C-40)

Given a wall, the student will cut and install base molding. Inside and outside corners will fit snugly with no cracks showing. Work must be completed to instructor's satisfaction.

TASK

C-41 Installing sliding and folding interior doors

PERFORMANCE OBJECTIVE

Install sliding and folding interior doors.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Folding doors
   1. Track and head jamb
   2. Pivots
   3. Door alignment
b. Installing folding doors
   1. Reading plans and specifications
   2. Measuring door opening
   3. Installing and aligning doors
   4. Checking for operating ease
c. Sliding doors
   1. Track and head jamb
   2. Floor guide
   3. Door alignment and clearance
d. Installing sliding doors
   1. Reading plans and specifications
   2. Measuring door opening
   3. Installing track to specifications
   4. Installing floor guide and track and aligning doors
   5. Checking doors for proper operation

Provide Practical Application On:

a. Installing sliding interior doors
b. Installing folding interior doors

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

A/Vs:

Prentice-Hall Media, "Completing the Interior"

Tools and Equipment:

a. Tool kit
b. Doors and hardware

CLASSROOM HOURS

6

EVALUATION (C-41)

a. Given a framed door opening, folding doors, hardware, specifications, and necessary tools, the student will install the folding doors to specifications so that the doors are in proper alignment and open and close with ease.

b. Given a framed door opening, interior sliding doors, hardware, specifications, working drawings and necessary tools, the student will install sliding doors according to specification. Doors must be properly aligned and open and close with ease.

TASK

C-42 Installing insulation

PERFORMANCE OBJECTIVE

Install insulation.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose of insulation
   1. Thermal
   2. Sound
b. Heat transfer
c. Condensation
d. Rating insulation
   1. BTV
   2. K-factor
   3. R-factor
   4. U-factor
e. Types of insulation material
   1. Mineral
   2. Vegetable
   3. Animal
   4. Chemical
f. Insulation materials
   1. Loose fill
   2. Reflective
   3. Rigid
   4. Chemical foam
g. Where to insulate
h. Installing insulating blankets and batts
   1. Ceiling insulation
   2. Wall insulation
i. Insulating floors
   1. Purpose
   2. Supporting the insulation
   3. Ventilation of crawl spaces
   4. Vapor barriers
j. Rigid insulation
   1. Purpose
   2. Installation

(continued on back)

INSTRUCTIONAL MATERIALS

Textbooks:

a. Douglas and Werner
b. Durbahn
c. Feirer and Hutchings
d. Rebaud
e. Wagner

A/Vs:

Prentice-Hall Media, "Completing the Interior"

Tools and Equipment:

a. Tool kit
b. Insulation material

CLASSROOM HOURS

3

EVALUATION (C-42)

Given a wall, ceiling or floor requiring insulation, necessary tools and insulation materials, the student will install insulation making sure all necessary areas have proper support and ventilation.

INSTRUCTIONAL ACTIVITIES (continued)

Provide Information On:

k. Insulating a masonry wall
    1. Chemical foam
    2. Rigid insulation
    3. Flexible insulation
l. Building codes

Provide Practical Application On:

Insulating a wall, ceiling or floor as assigned

TASK

P-01 Identifying the nature of the work of plumbers

PERFORMANCE OBJECTIVE

Identify the nature of the work of plumbers.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of work
b. Nature of the work
c. Places of employment
d. Types of pipe installation
e. Training, other qualifications and advancement
f. Special training required in plumbing trades
g. Employment outlook
h. Apprenticeship opportunities
i. Earnings and working conditions
j. Career opportunities

INSTRUCTIONAL MATERIALS

Textbooks:	Student Manuals:
Ripka	Georgia, Unit ITP-1

CLASSROOM HOURS

4

EVALUATION (P-01)

Given necessary information, the student will demonstrate a knowledge of the field of plumbing by identifying with 90% accuracy the nature of the work of plumbers.

TASK

P-02 Selecting pipe and fittings

PERFORMANCE OBJECTIVE

Identify and match threaded pipe and fittings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of pipe
b. Selecting types of pipe (galvanized, block, steel, etc.)
c. Types of fittings (reduces, unions, etc.)
d. Uses of different types of fittings
e. Examining fittings

Provide Demonstration On:

How to use different types of fittings

Provide Practical Application On:

Matching pipe and fittings

INSTRUCTIONAL MATERIALS

Textbooks:

a. Orvatez, Drainage, Fittings and Fixtures
b. Ripka

Student Manuals:

Georgia, Unit BPP-1-1

CLASSROOM HOURS 5

EVALUATION (P-02)

Given a large assortment of pipe and fittings, the student will correctly name the types of fittings and demonstrate how they must be used with different types of pipe. Fittings must be correctly identified according to the manufacturer's and/or instructor's specifications. Uses of the fittings must be made in accordance with local code.

TASK

P-03 Measuring pipe

PERFORMANCE OBJECTIVE

Demonstrate an ability to measure pipe.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Reading a rule
b. Measuring with a rule
c. Methods of measuring pipe
d. Determining types of pipe measurements
e. Measuring pipe

Provide Demonstration On:

Special techniques and methods for measuring pipe

Provide Practical Application On:

Measuring pipe using at least three common methods

INSTRUCTIONAL MATERIALS

Textbooks:

a. Day
b. Ripka

Student Manuals:

Georgia, Unit BPP-2

Tools and Equipment:

a. Rulers
b. Tapes
c. Lengths of pipe in various diameters

CLASSROOM HOURS 2

EVALUATION (P-03)

Given a large assortment of pipe, the student will demonstrate an ability to measure pipe using the three common methods of pipe measuring. Measurements should match those made by the instructor or other experts.

TASK

P-04 Cutting and reaming metal pipe

PERFORMANCE OBJECTIVE

Cut and ream pipe.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Sizes of pipe
b. Tools used in cutting and reaming pipe
c. Methods of cutting and reaming pipe
d. Cutting pipe with hacksaw
e. Cut pipe with pipe cutter
f. Reaming pipe

Provide Demonstration On:

a. Measuring for the cut
b. Using cutting tools
c. Cutting procedures
d. Checking the cut
e. Reaming the pipe

Provide Practical Application On:

Cutting and reaming pipe

INSTRUCTIONAL MATERIALS

Textbooks:

Ripka

Student Manuals:

Georgia, Unit BPP-3

Tools and Equipment:

a. Hacksaw (18 tooth blades)
b. Pipe cutters
c. Pipe reamers
d. Rule or tape
e. Tubing cutters with reamer

CLASSROOM HOURS

4

EVALUATION (P-04)

Given different diameters of galvanized pipe, the student will demonstrate an ability to cut the pipe with both a hacksaw and a pipe cutter and ream the pipe after cutting. The cut should be square and free of burrs.

TASK

P-05 Threading pipe

PERFORMANCE OBJECTIVE

Thread and make up fittings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Methods of threading pipe
b. Threading pipe with machine threader
c. Holding the pipe
d. Methods of connecting galvanized pipe
e. Threading pipe with hand threader

Provide Demonstration On:

a. Threading pipe with machine and hand threaders
b. Making up fittings using a pipe wrench
c. Uses of vise

Provide Practical Application On:

a. Threading various sizes of pipe
b. Making up fittings
c. Fitting allowance

INSTRUCTIONAL MATERIALS

Textbooks:

a. Day
b. Ripka
c. Slater, Plumbing I

Student Manuals:

Georgia, Unit BPP-4

Tools and Equipment:

a. Pipe wrenches
b. Machine threaders
c. Hand threader
d. Assortment of pipes and fittings
e. Cutting oil
f. Rags

CLASSROOM HOURS	4

EVALUATION (P-05)

Given an assortment of galvanized pipe that differs in diameter, the student will demonstrate an ability to thread the pipe with both hand and machine threaders. Using an appropriate pipe wrench, make up several pipes with fittings. The work must meet standards acceptable by industry requirements.

TASK

P-06 Identifying copper pipe fittings

PERFORMANCE OBJECTIVE

Identify copper pipe fittings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of copper fittings
b. Determining uses of fittings
c. Selecting copper fittings
d. Using copper fittings

Provide Demonstration On:

a. Techniques for using copper pipe fittings
b. Correctly name fitting as to use and size

Provide Practical Application On:

Using copper pipe fittings on pre-prepared pipe

INSTRUCTIONAL MATERIALS

Textbooks:

a. Day
b. Slater and Smith
c. Ripka

Student Manuals:

Georgia, Unit BPP-5

Tools and Equipment:

a. Copper pipe
b. Assortment of fittings for copper pipe

CLASSROOM HOURS 3

EVALUATION (P-06)

Given an assortment of fittings for copper pipe, the student will name the fittings and describe their uses. The student should name and describe the use of at least the following kinds of fittings:

1. 45° ell
2. Union
3. Reducing tee
4. Cap
5. 90° ell
6. Coupling
7. Valve, angle valve 5/8 x 1/2 compression or straight valve
8. Tee
9. Adaptor, male x sweat (mip)
10. Flexible pipe
11. Adaptor female x sweat (fip)
12. Rigid pipe, types K, L or M
13. Reducing couplings
14. Street ells

TASK

P-07 Laying out, cutting, reaming, flaring and flanging copper tubing

PERFORMANCE OBJECTIVE

Layout, cut, ream, flare and flange a piece of copper tubing.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Methods of connecting copper tubing
b. Using different methods of copper connections
c. Cutting copper tubing
d. Reaming copper tubing
e. Flaring copper tubing
f. Making flared connections

Provide Demonstration On:

a. Plan and layout copper tubing for various applications
b. Cutting copper tubing
c. Reaming copper tubing
d. Flaring copper tubing
e. Making flared connections

Provide Practical Application On:

a. Laying out copper tubing
b. Cutting and reaming
c. Flaring and flanging the tubing

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater and Smith
b. Ripka

Student Manuals:

Georgia, Unit BPP-6

Tools and Equipment:

a. Copper tubing
b. Fittings for copper tubing
c. Flaring tools
d. Flanging tools, swaging tools

CLASSROOM HOURS

4

EVALUATION (P-07)

Given copper tubing, fittings and necessary tools, the student will flare and flange copper tubing using specifications provided by the instructor. The resulting product should be free of burrs and must not leak in a standard pressure test.

TASK

P-08 Soldering copper tubing

PERFORMANCE OBJECTIVE

Solder copper tubing using sweat joints.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of copper tubing
b. Selecting sweat fittings
c. Types of solder
d. Sweating copper tubing
e. Sweating a vertical top joint
f. Sweating a vertical bottom joint
g. Sweating a horizontal joint
h. Using a torch

Provide Demonstration On:

Techniques for sweating vertical top joints, vertical bottom joints and horizontal joints
1. Cleaning tubing
2. Apply flux
3. Heating the fitting

Provide Practical Application On:

Sweating the different types of copper tubing joints

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater and Smith
b. Ripka

A/Vs:

Georgia, slide set BPP-7

Student Manuals:

Georgia, Unit BPP-7

Tools and Equipment:

a. Copper tubing
b. Acetylene torch
c. Solder
d. Vice
e. Steel wool or emery cloth
f. Noncorrosive flux

CLASSROOM HOURS

4

EVALUATION (P-08)

Given copper tubing, fittings and necessary tools and specifications provided by the instructor, the student will solder copper tubing using sweat joints. The resulting product should be leak-proof in a standard pressure test.

TASK

P-09 Joining copper tubing to brass pipe

PERFORMANCE OBJECTIVE

Join copper tubing to brass pipe.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Copper and brass fittings
b. Flaring copper tubing
c. Tools used on brass fittings
d. Making up flared fittings
e. Thread sealant for non-ferrous fittings
f. Characteristics of copper tubing (hardening-annealing)

Provide Demonstration On:

a. Flaring copper tubing
b. Annealing copper tubing
c. Tightening techniques

Provide Practical Application On:

a. Flare tubing
b. Applying ribbon type sealant
c. Making up threaded joint
d. Making up flared joint

INSTRUCTIONAL MATERIALS

Textbooks:

a. Day
b. Oravetz
c. Slater

A/Vs:

a. Audio Active, tape 2, side 1
b. Autio Active, tape 3, side 1

Student Manuals:

a. Georgia, Unit BPP-5
b. Plumbing II, Unit 2
c. Georgia, Unit BPP-6

Tools and Equipment:

a. Flaring tool
b. Flare adapter
c. Threaded brass pipe
d. Pipe wrench
e. 2 combination wrenches
f. Teflon ribbon

CLASSROOM HOURS 3

EVALUATION (P-09)

a. Given necessary tools and materials, the student will flare copper tubing and join to threaded brass pipe. The completed work must have a smooth flare, alignment of parts and no binding of flare nut.

b. Checkpoint Sheet, Plumbing II, Unit BPP-5.

c. Assignment Sheet, Plumbing II, No. 7, 14, 16, 19 and 20.

TASK

P-10 Joining copper tubing to copper pipe

PERFORMANCE OBJECTIVE

Join copper tubing to copper pipe.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Cutting copper tubing pipe
b. Solder and flux compositions
c. Theory of capillary attraction and surface tension
d. Sweat soldering with propane torch
e. Wiped joint vs visible solder bead joint

Provide Demonstration On:

a. Cutting and reaming copper pipe
b. Light and adjust torch
c. Applying heat and solder

Provide Practical Application On:

a. Cutting, reaming and fitting copper pipe
b. Cleaning and applying flux
c. Sweat soldering joints

INSTRUCTIONAL MATERIALS

Textbooks:

a. Day
b. Slator and Smith
c. Oravetz
d. Matthias and Smith

A/Vs:

BPP-7

Student Manuals:

a. Plumbing II, Unit 2
b. Georgia, Unit BPP-7

Tools and Equipment:

a. Tubing cutters
b. Hacksaw
c. 50/50 solder
d. Non-corrosive flux
e. Steel wool & 180 gritemory cloth
f. Fitting brush
g. Copper pipe & tubing
h. Sweat coupling
i. Propane torch

CLASSROOM HOURS 2

EVALUATION (P-10)

a. Given tools and materials, the student will join copper pipe to copper tube using sweat method. The finished product must not show signs of overheating and should have smooth solder bead with no heavy drip or runs.

b. Plumbing II, Unit 2

TASK

P-11 Joining copper tubing to steel pipe

PERFORMANCE OBJECTIVE

Join copper tubing/pipe to steel pipe

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Making up threaded fittings
b. Sweat soldering copper fittings
c. Electrolytic action between dissimilar metals
d. Purpose, function and characteristics of dielectric unions
e. Tools for brass fittings

Provide Demonstration On:

a. Disassembly and application of dielectric union
b. Orientation of union parts
c. Sweat solder union half to copper
d. Making up 3 pc. union

Provide Practical Application On:

a. Make up threaded joint with pipe wrench and adjustable wrench
b. Sweat solder brass fitting to copper
c. Disassemble and assemble dielectric union
d. Make up 3 pc. union

INSTRUCTIONAL MATERIALS

Textbooks:

a. Matthias and Smith
b. Slater
c. Oravetz

A/Vs:

Audio Active, tape 3, side 1

Tools and Equipment:

a. Pre-threaded steel pipe or mock-up
b. Copper pipe
c. Sweat solder kit
d. Pipe wrench
e. Adjustable wrench
f. Thread sealant
g. Dielectric union

CLASSROOM HOURS

2

EVALUATION (P-11)

Given tools, materials, pre-threaded steel pipe or mock-up, the student will join copper pipe to steel pipe with dielectric union. Completed product must show 2 to 3 imperfect threads, smooth solder bead and be aligned with no binding.

TASK

P-12 Bending copper tubing with a spring bender

PERFORMANCE OBJECTIVE

Bend copper tubing using spring type bender.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Characteristics of types of copper tubing
b. Tools used for copper work
c. Use of protractor

Provide Demonstration On:

a. Use of spring type bender
b. Layout angle

Provide Practical Application On:

a. Cutting copper tubing
b. Bend tubing to layout angle
c. Setting up try stand vise

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slator
b. Oravetz

A/Vs:

a. Audio Active, tape 1, side 1
b. Audio Active, tape 3, side 1

Student Manuals:

a. Plumbing I Workbook, Unit 8
b. Basic Plumbing, Unit 7

Tools and Equipment:

a. Copper tubing
b. Spring bender
c. Tubing cutter
d. Chalk or pencil
e. Protractor

CLASSROOM HOURS 1

EVALUATION (P-12)

a. Given tools and supplies, the student will bend a piece of copper tubing to specified angle ± 3°. The bend area must not be flattened or kinked.

b. Plumbing I, Unit 8

TASK

P-13 Bending steel pipe

PERFORMANCE OBJECTIVE

Bend an offset in galvanized pipe.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Offsetting pipe to other than standard fitting angles
b. Methods of bending pipe
c. Back to back and center to center measurements

Provide Demonstration On:

a. Anchoring vise stand
b. Bending pipe
c. Using rule or straight edge to find "High Point" to align bends

Provide Practical Application On:

a. Layout bend points
b. Bending pipe
c. Aligning bend points

INSTRUCTIONAL MATERIALS

Textbooks:

a. Arco
b. Oravetz
c. Matthias and Smith
d. Frankland

Student Manuals:

a. Arco, Plumbing and Heating Guide
b. Plumbing I, Unit 4

Tools and Equipment:

a. Try stand vise and ceiling
b. Anchor pipe
c. Folding rule
d. Torpedo level
e. 3/4" glavanized pipe

CLASSROOM HOURS 2

EVALUATION (P-13)

Given tools and materials, the student will bend a piece of galvanized pipe to specified offset ± 1/16. The completed product must lie flat on the floor its entire length. The bend area must not be flattened, wrinkled or kinked.

TASK

P-14 Cutting cast iron soil pipe

PERFORMANCE OBJECTIVE

Cut cast iron soil pipe.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of sizes of cast iron pipe
b. Uses of cast iron pipe
c. Methods of cutting cast iron pipe
d. Cutting cast iron pipe with a chisel
e. Cutting cast iron pipe with cutters
f. Using cast iron cutters to cut pipe
g. Safety

Provide Demonstration On:

a. Cutting cast iron pipe with cutters
b. Cutting cast iron pipe with a chisel

Provide Practical Application On:

Cutting cast iron pipe

INSTRUCTIONAL MATERIALS

Textbooks:

a. Oravetz
b. Slater and Smith
c. Ripka

Student Manuals:

Georgia, Unit BPP-8

Tools and Equipment:

a. Chisel
b. Hammer
c. Pipe cutter, soil pipe cutters
d. Cast iron pipe

CLASSROOM HOURS

2

EVALUATION (P-14)

Given cast iron pipe, the student will demonstrate an ability to cut the pipe with a chisel and hammer or snap type chain cutter. The cut should be square and relatively free of rough edges.

TASK

P-15 Caulking a lead joint on cast iron soil pipe

PERFORMANCE OBJECTIVE

Caulk a lead joint on cast iron soil pipe in both the vertical and horizontal position.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Joining cast iron pipe
b. Pouring and caulking a lead joint (vertical)
c. Pouring and caulking a lead joint (horizontal)

Provide Demonstration On:

Techniques for pouring and caulking a lead joint on cast iron soil pipe (vertical and horizontal)

Provide Practical Application On:

Pouring and caulking a lead joint on cast iron soil pipe (vertical and horizontal)

INSTRUCTIONAL MATERIALS

Textbooks:

a. Oravetz
b. Ripka

Student Manuals:

Georgia, Unit BPP-9

Tools and Equipment:

a. Oakum
b. Lead
c. Cast iron pipe
d. Packing tools, iron, joint tools, hammer
e. Burner
f. Lead pot
g. Laddle
h. Joint runner
i. Inside and outside caulking tool

CLASSROOM HOURS 2

EVALUATION (P-15)

Given supplies and equipment, the student will correctly caulk and pour a lead joint for cast iron soil pipe in both the vertical and horizontal position.

TASK

P-16 Identifying plastic pipe fittings

PERFORMANCE OBJECTIVE

Identify plastic pipe fittings.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of plastic pipe
b. Uses of plastic pipe
c. Types of fittings

Provide Demonstration On:

Techniques for using plastic pipe fittings
  1. Name fittings
  2. Joining to pipe procedures

Provide Practical Application On:

Using plastic pipe fittings in laying out plumbing

INSTRUCTIONAL MATERIALS

Textbooks:

a. Day
b. Ripka

Student Manuals:

Georgia, Unit BPP-10

Tools and Equipment:

Assortment of fittings for plastic pipe

CLASSROOM HOURS 3

EVALUATION (P-16)

Given an assortment of fittings for plastic pipe, the student will name the fittings and describe their use. The student should be able to name and describe the following types of fittings:

ABS or PVC fittings used for drain, waste or vent (D.W.V.)

1. Elbows, 90°, 60°, 45°, 22-1/2°
2. Elbow, vent
3. Elbow, trap
4. Plastic to soil pipe adaptor
5. Tee
6. Vent tee
7. Wye
8. Plastic to no-hub adaptor
9. Clean-out
10. Traps
11. Trap connector
12. Plastic tee mip adaptor
13. Clean-out tee
14. Long sweep-t-y
15. Closet flange
16. Couplings

TASK

P-17 Cutting and joining plastic pipe

PERFORMANCE OBJECTIVE

Cut and join plastic pipe.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Joining plastic pipe
b. Joining PVC
c. Connecting PVC pipe
d. Joining PBS
e. Connecting PBS pipe
f. Cutting pipe

Provide Demonstration On:

a. Cutting plastic pipe
b. Joining and connecting plastic pipe
c. Reaming

Provide Practical Application On:

Laying out, cutting and joining plastic pipe using the solvent weld method

INSTRUCTIONAL MATERIALS

Textbooks:

Ripka

Student Manuals:

Georgia, Unit BPP-11

Tools and Equipment:

a. PVC pipe
b. ABS pipe
c. Solvent
d. Hacksaw
e. Clamps
f. Plastic pipe cutters
g. Reaming tools
h. Fittings
i. Rags

CLASSROOM HOURS

1

EVALUATION (P-17)

Given adequate supplies and equipment, the student will lay-out, cut and join a piece of plastic pipe using the solvent weld method. The resulting product should be leak-proof in a standard pressure test.

TASK

P-18 Roughing-in fixtures

PERFORMANCE OBJECTIVE

Layout and cut all holes needed to install water supply, drainage, waste and vent piping.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Locating fixture layout from plans
b. Locate fixture locations
c. Layout holes for supply
d. Layout holes for drains and waste
e. Layout holes for venting
f. Cutting holes for pipe installation

Provide Demonstration On:

a. Locating and laying out fixtures
b. Installing fixtures

Provide Practical Application On:

Locate, layout and cut all holes needed to install water supply, drainage, waste and vent piping.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Oravetz
b. Ripka, Plumbing Code

Student Manuals:

Georgia, Unit RI-1 and RI-2

Tools and Equipment:

a. Rulers
b. Tapes
c. Markers
d. Drills
e. Brace and bit
f. Saws

CLASSROOM HOURS

3

EVALUATION (P-18)

Given room dimensions, the student will determine the roughed-in measurements and cut holes needed to install water supply, drainage, waste and vent piping. Plans and layout must be made according to local codes and professional standards.

TASK

P-19 Selecting and installing fittings and pipe

PERFORMANCE OBJECTIVE

Select, assemble and install drain, waste and vent piping.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Selecting fittings for application
b. Installing drainage waste and vent piping system
c. Designing pipe layout

Provide Demonstration On:

Installation techniques

Provide Practical Application On:

Selecting, assembling and installing drain, waste and vent piping

INSTRUCTIONAL MATERIALS

Textbooks:

a. Oravetz
b. Ripka, Plumbing Code

Student Manuals:

Georgia, Unit RI-3 and RI-4

Tools and Equipment:

a. Wrenches
b. Pipe
c. Fittings

CLASSROOM HOURS 3

EVALUATION (P-19)

Given a roughed-in layout with all holes cut, the student will select and install all fittings and pipe needed to install drainage, waste and vent piping for a bath. Installation should meet local code requirements and should be leak-proof.

TASK

P-20 Installing vent terminals

PERFORMANCE OBJECTIVE

Install vent stack roof flashing.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Soil and waste fittings
b. Code requirements for vent terminals
c. Sealing and frost-proofing vent terminals
d. Layout for flat and pitched roof

Provide Demonstration On:

a. Setting angel on adjustable roof flange
b. Forming lead tube around pipe
c. Installing flashing

Provide Practical Application On:

a. Adjusting prefabricated flashing flange
b. Forming lead tube around pipe
c. Installing roof flashing

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. D'Arcangelo and Guest

A/Vs:

Audio Active, lesson 4; tape 2, side 2

Student Manuals:

a. Plumbing II, Unit II
b. Mathematics for Plumbers and Pipefitters, Unit 47

Tools and Equipment:

a. Hammer
b. Sealing material

CLASSROOM HOURS 6

EVALUATION (P-20)

a. Given tools, supplies and a roof and vent mock-up, the student will vent stack terminal flashing. The completed product must not leak around the stack or bulge roofing material.

b. Review Questions, Plumbing II, Unit II

TASK

P-21 Installing cold and hot water supply

PERFORMANCE OBJECTIVE

Install the cold and hot water supply to fixtures, water closet, bathtub with shower, lavatory and kitchen sink.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Planning the supply pipe layout
b. Design the supply pipe layout
c. Installing the cold and hot water supply

Provide Demonstration On:

a. Safety
b. Pipe support
c. Water heater
d. Code

Provide Practical Application On:

a. Rough-in supply
b. Finish installation for above fixture
c. Water test to specifications
d. Repair leak (if any)

INSTRUCTIONAL MATERIALS

Textbooks:

Ripka

Student Manuals:

Georgia, Unit RI-5 and RI-6

Tools and Equipment:

a. Pipe and fittings
b. Solder, flux and sand cloth
c. Pipe and tubing cutters
d. Rule and tape
e. Adjustable wrenches
f. Channel lock pliers
g. Screwdrivers

CLASSROOM HOURS

3

EVALUATION (P-21)

Given a layout location with fixture set and the D.W.V. installed, the student will install the water supply for each fixture. Installation should meet local code requirements and should be water and air tight. Installation should be in two steps (1) Rough-in and (2) Finish.

TASK

P-22 Installing cleanouts on waste lines

PERFORMANCE OBJECTIVE

Install cleanout plug on waste lines.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Soil and waste fittings
b. Soil and waste joining methods
c. Location of cleanouts
d. Types of cleanouts

Provide Demonstration On:

a. Selecting type of cleanout for particular situation
b. Joining method
c. Lubricating and installing plug

Provide Practical Application On:

a. Fitting and joining
b. Installing and operating cleanout

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Matthais and Smith
c. Oravetz
d. Day

A/Vs:

a. Audio Active, lesson 4; tape 2, side 2
b. Audio Active, lesson 7; tape 4, side 1

Student Manuals:

a. *Plumbing I*, Unit 39
b. *Basic Plumbing*, Unit 48

Tools and Equipment:

a. Sanitary waste joining materials
b. Sanitary waste work tools

CLASSROOM HOURS

5

EVALUATION (P-22)

a. Given tools, supplies and a prefabricated or mock-up situation, the student will install a waste cleanout fitting. The location and support must confirm to Plumbing Code, must not leak and the plug must easily removed and replaced.

b. Review Questions, Plumbing I, Unit 39

c. Performance Guide, V'TECS, Task81

d. Review Questions, Basic Plumbing, Unit 48

TASK

P-23 Installing bathtubs and showers

PERFORMANCE OBJECTIVE

Install a bathtub and shower.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of drain and overflow
b. Uses of drain and overflow
c. Installing bathtub
d. Installing shower unit
e. Installing trim for tub and shower
f. Diverter valve
g. Shower head

Provide Demonstration On:

a. Installing tubs and showers
b. Installing trim
c. Diverter valve

Provide Practical Application On:

Installing tubs, showers and trim

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater and Smith
b. Ripka

Student Manuals:

Georgia, Unit IF-1

Tools and Equipment:

a. Tub with shower
b. Drain and overflow
c. Diverter valve
d. Pipe and make up fittings
e. Level
f. Screwdrivers
g. Adjustable wrenches

CLASSROOM HOURS	3

EVALUATION (P-23)

Given necessary supplies and equipment, the student will install a bathtub, a shower and trim for each. The installation will be neat, level and pleasing to the customer.

TASK

P-24 Installing a water closet

PERFORMANCE OBJECTIVE

Install a water closet.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of closet seals
b. Assembly of water closet
c. Installing water closet
d. Mount water closet to waste
e. Connecting supply pipe and valve
f. Testing for leaks

Provide Demonstration On:

a. Assembling a water closet
b. Installing the water closet
c. Testing for leaks

Provide Practical Application On:

a. Assembling and installing a water closet
b. Connecting the water closet to waste pipe and supply pipe and testing for leaks

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater and Smith
b. Ripka

A/Vs:

Georgia, slide set IF-2

Student Manuals:

Georgia, Unit IF-2

Tools and Equipment:

a. Water closet
b. Closet flange
c. Wax seal
d. Ball cock and flush valve
e. Supply tube and valve
f. Adjustable wrenches
g. Screwdrivers
h. Tubing cutters
i. Level
j. Hammer

CLASSROOM HOURS

2

EVALUATION (P-24)

Given necessary supplies and equipment, the student will assemble and install a water closet and connect supply and waste lines. The water closet must be correctly aligned and must not leak.

TASK

P-25 Installing a wall hung lavatory

PERFORMANCE OBJECTIVE

Install a wall hung lavatory.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of lavatories
b. Types of mixing valves
c. Procedures to install lavatory
d. Installing hangars and mounting lavatory
e. Install faucet
f. Install drain and tail piece
g. Install trap and connect drain
h. Connecting supply lines
i. Test lavatory for leaks and repair

Provide Demonstration On:

Techniques for installing lavatories

Provide Practical Application On:

a. Installing lavatories
b. Installing faucet, trap, drain, supply line valves and hangers

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater and Smith
b. Ripka

Student Manuals:

Georgia, Unit IF-3

Tools and Equipment:

a. Lavatory, faucet, trap, drain valve and supply tubes
b. Adjustable wrenches
c. Screwdrivers
d. Hammer
e. Rule
f. Tubing cutters
g. Level
h. Basin wrench

CLASSROOM HOURS 2

EVALUATION (P-25)

Given necessary supplies and equipment, the student will install a wall hung lavatory and make all necessary connections. The installation should be level and free of leaks.

TASK

P-26 Installing a kitchen sink

PERFORMANCE OBJECTIVE

Install a kitchen sink.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of traps for kitchen sinks
b. Selection of appropriate traps
c. Installation of kitchen sink
d. Installing faucet
e. Mounting and securing sink unit
f. Connect traps and drains
g. Connect supply lines
h. Install supply valves

Provide Demonstration On:

Techniques for installing and connecting a kitchen sink

Provide Practical Application On:

a. Installing kitchen sink
b. Installing faucet, trap, drains, supply lines and valves
c. Testing for leaks

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater and Smith
b. Ripka

Student Manuals:

Georgia, Unit IF-4

Tools and Equipment:

a. Sink, faucet, drain, cross-over, trap, valves and supply tools
b. Adjustable wrenches
c. Screwdriver
d. Basin wrench
e. Rule
f. Level
g. Tubing cutters

CLASSROOM HOURS 2

EVALUATION (P-26)

Given necessary supplies and equipment, the student will install a kitchen sink and make all necessary connections. The installation should be level, neat and free of leaks.

TASK

P-27 Installing electric water heaters

PERFORMANCE OBJECTIVE

Install an electric hot water heater.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Electric heating elements and control thermostats
b. Accessibility to renewable parts.
c. Temperature/pressure relief valves

Provide Demonstration On:

a. Methods of wiring dual elements and thermostats
b. Adjusting thermostats
c. Leveling heater

Provide Practical Application On:

a. Setting thermostats
b. Installing temperature/pressure relief valve
c. Installing water heater to hot and cold water mains

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day
d. Mathais and Smith

A/Vs:

Audio Active, lesson 16; tape 8, side 2

Student Manuals:

Plumbing II, Unit 41

Tools and Equipment:

a. Fixture installation kit
b. V.O.M.
c. Pipejoint sealant
d. Wire nuts and tape

CLASSROOM HOURS 6

EVALUATION (P-27)

a. Given tools, supplies and a plumbing mock-up, the student will install an electric water heater to supply 140° F. The water heater must not have water leaks. Access panels, must be unobstructed and the water temperature must maintain ± 10° of the setting.

b. Performance Guide, V'TECS, Task 97

c. Review Questions, Plumbing II, Unit 41

TASK

P-28 Supporting horizontal and vertical pipes

PERFORMANCE OBJECTIVE

Secure horizontal and vertical pipeline.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Pipe hangers and saddles
b. Distance between hangers
c. Masonry fasteners
d. Wood fasteners
e. Metal fasteners

Provide Demonstration On:

a. Attaching hanger to pipe and support
b. Use of masonry drills
c. Installing expansion anchors
d. Installing toggle type anchors

Provide Practical Application On:

a. Installing hangers on pipe
b. Installing saddles for insulated pipe hangers
c. Fabricating stand off brackets for vertical lines
d. Adjusting hangers with threaded rod

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slator
b. Matthais and Smith
c. Oravetz

Student Manuals:

a. *Plumbing I*, Unit 24
b. *Basic Plumbing*, Units 28 and 29
c. *Plumbing Code*

Tools and Equipment:

a. Hangers and hanging materials
b. Assortment of fastenings
c. Torpedo level
d. Folding rule or steel tape

CLASSROOM HOURS

6

EVALUATION (P-28)

a. Given a length of pipe, tools and materials, the student will install hangers, brackets and pipe horizontally and vertically. Pipe must be level and plumb and measured by a 9" torpedo level. Anchors must be firm and tight in masonry, wood or metal.

b. Performance Guide, V'TECS, Task 51

c. Basic Plumbing, Units 28 and 29

TASK

P-29 Installing cut off valves

PERFORMANCE OBJECTIVE

Install cut off valves on branch line.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Valve types and application
b. Safety precautions on pressurized lines

Provide Demonstration On:

a. Valve identification (service, pressure direction of flow, etc.)
b. Adding stem packing
c. Internal repairs

Provide Practical Application On:

a. Disassembling valve
b. Inspecting seat, disc, "O" rings and packing
c. Assembling valve
d. Installing valve

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slator
b. Oravetz
c. Matthais and Smith

Student Manuals:

Plumbing II, Unit 17

Tools and Equipment:

a. Pipe wrench
b. Adjustable wrench
c. Stem packing
d. Pipe joint sealant

CLASSROOM HOURS

6

EVALUATION (P-29)

a. Given tools, materials and a pressurized water main with tee branch, the student will install branch cut off valve. Completed installation must not leak through the seat, at the joint, the bonnet or the stem gland, under normal building pressure.

b. Review Questions, Plumbing II, Unit 17

TASK

P-30 Installing pressure relief valves

PERFORMANCE OBJECTIVE

Install pressure relief valve.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Maximum working pressure of vessels
b. Purpose, function and characteristics of relief valves
c. Safety considerations for relief valves
d. Plumbing Code requirements for relief valves

Provide Demonstration On:

a. Bench testing of relief valve
b. Manual lifting of relief valve
c. Setting relief valve lifting pressure

Provide Practical Application On:

a. Bench testing and operation of relief valve
b. Locating vessel specification tag
c. Installing relief valve

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Matthais and Smith
d. Walters and Ferrell
e. Plumbing Code

Student Manuals:

Plumbing II, Unit 40

Tools and Equipment:

a. Pipe wrench
b. Adjustable wrench
c. Joint sealant
d. Test bench and gauges

CLASSROOM HOURS

6

EVALUATION (P-30)

a. Given tools, materials and a pressure vessel, the student will install pressure relief valve. The valve must have no leaks at normal operating pressure, be clear of obstructions with pop off opening and safely oriented.

b. Review Questions, Plumbing II, Unit 40

TASK

P-31 Cleaning pressure regulating valves

PERFORMANCE OBJECTIVE

Clean and repair pressure regulating valves (spring and diaphram type).

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose, function and characteristics of pressure regulating valves
b. Types of regulating valves
c. Protection of regulating valves
d. Wear and failure points

Provide Demonstration On:

a. Disassembling, inspecting and repairing regulating valve
b. Adjusting regulating valves
c. Testing regulating valves

Provide Practical Application On:

a. Disassembling valves
b. Inspecting valves
c. Repairing regulating valves
d. Adjusting valves

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Matthais and Smith
d. Walters and Ferrell

Student Manuals:

Plumbing II, Unit 19

Tools and Equipment:

a. Valve service kit
b. Lapping compound
c. Surface plate

CLASSROOM HOURS 6

EVALUATION (P-31)

a. Given tools, supplies and a hydronic work and test station, the student will disassemble, clean, inspect, repair and adjust regulating valves. The installed valves must have no external leaks and must maintain set pressure with no excessive chattering noises.

b. Review Questions, Plumbing II, Unit 19

TASK

P-32 Insulating water lines

PERFORMANCE OBJECTIVE

Apply insulation to not water line.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose and characteristics of thermal insulation
b. "R" valve and "U" valve
c. Weather and moisture protection

Provide Demonstration On:

a. Applying insulation
b. Turning cover laps away from weather or possible abrasion
c. Fitting insulation around valves and fittings

Provide Practical Application On:

a. Applying insulation
b. Applying weather-proofing
c. Fitting around fittings

INSTRUCTIONAL MATERIALS

Textbooks:

a. Walters and Ferrell
b. Matthais and Smith
c. Oravetz

Tools and Equipment:

a. Insulation saw and knife
b. Stapler
c. Cement, glue or paste
d. Soft wire or tape
e. Weather-proofing and brush or trowel

CLASSROOM HOURS	4

EVALUATION (P-32)

a. Given tools, materials and a section of pipe, the student will cut, fit and wrap insulation. Sections must be butted tightly, fittings completely covered and laps away from view or weather.

b. Performance Guide, V'TECS, Task 63

TASK

P-33 Making water pressure tests on water supply systems

PERFORMANCE OBJECTIVE

Test water supply system for leaks (hydrostatically).

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Filling and venting systems
b. Testing systems for leaks
c. Operating principles of hydrostatic test pumps

Provide Demonstration On:

a. Venting a system
b. Operating hydrostatic test pump
c. Effects of system and ambient temperatures on test gauges

Provide Practical Application On:

a. Venting and filling system
b. Using hydrostatic test pump
c. Observing and recording test pressure over 24 hour period
d. Locating leaks

INSTRUCTIONAL MATERIALS

Textbooks:

a. Walters and Ferrell
b. Matthais and Smith
c. Oravetz
d. Slater

Student Manuals:

Plumbing II, Unit 21

Tools and Equipment:

a. Hydrostatic test pump
b. Pencil and data sheet

CLASSROOM HOURS 6

EVALUATION (P-33)

a. Given equipment, supplies and a water supply system, the student will fill, vent and perform a hydrostatic test for system leaks 20% above normal operating pressure. Proper filling, venting and testing will be evidenced by no pressure drop in a 24 hour period.

b. Performance Guide, V'TECS, Task 64

c. Review Questions, Plumbing II, Unit 21

TASK

P-34 Roughing-in water supply lines for water heaters

PERFORMANCE OBJECTIVE

Rough-in water supply line for installation of water heater.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Lay out location from manufacturer's specifications
b. Use of ship auger for boring holes in wood
c. Supporting roughed-in stub

Provide Demonstration On:

a. Figuring allowance between rough and finished wall
b. Boring holes with auger bit
c. Installing and supporting rough-in stub

Provide Practical Application On:

a. Calculating and laying out location
b. Boring holes
c. Running and supporting rough-in stub

INSTRUCTIONAL MATERIALS

Textbooks:

a. Salter
b. Oravetz
c. Day

A/Vs:

Audio Active, lesson 19, tape 10, side 1

Student Manuals:

Plumbing I, Unit 55

Tools and Equipment:

a. Brace and auger bit (ship auger)
b. Layout tool kit

CLASSROOM HOURS 6

EVALUATION (P-34)

a. Given tools, supplies and a plumbing mock-up, the student will layout, bore holes and install rough-in stub for hot water heater. The stub must be rigidly supported, extended 6" from finished wall and conform to specifications of fixture manufacturer.

b. Performance Guide, V'TECS, Tasks 66 and 68

c. Review Questions, Plumbing I, Unit 55

TASK

P-35 Clearing obstructions from lavatory drains

PERFORMANCE OBJECTIVE

Remove material obstructing the flow in a drain line.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Tools and materials for clearing drains
b. Locating obstructions
c. Removing and cleaning "P"-traps

Provide Demonstration On:

a. Using force cup
b. Using coil wire or snake
c. Disassembling and assembling "P"-trap

Provide Practical Application On:

a. Using force cup
b. Using snake
c. Disassembling and assembling "P"-trap

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day

A/Vs:

Audio Active, lesson 5; tape 3, side 1

Student Manuals:

a. Plumbing I, Unit 42
b. Basic Plumbing, Unit 51

Tools and Equipment:

a. Force cup
b. Coil wire
c. Slip-joint wrench
d. Slip-joint washers

CLASSROOM HOURS 4

EVALUATION (P-35)

a. Given tools, materials and a clogged, mock-up drain, the student will locate and remove obstructions. The waste line and trap must not leak and must permit full flow of water.

b. Review Questions, Plumbing I, Unit 42

c. Review Questions, Basic Plumbing, Unit 51

TASK

P-36 Removing obstructions from a main drain line

PERFORMANCE OBJECTIVE

Dislodge material obstructing the flow in a main drain line.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Tools and materials for cleaning drain lines
b. Locating obstruction
c. Methods of clearing drain lines

Provide Demonstration On:

a. Use force cup
b. Using flat rod
c. Operating roto rooter
d. Using gimlets and cutters
e. Installing test plugs

Provide Practical Application On:

a. Using force cup
b. Using flat rod
c. Operating power sewer cleaning
d. Installing test plugs and applying air pressure

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day

A/Vs:

Audio Active, lesson 5; tape 3, side 1

Student Manuals:

a. *Plumbing I*, Unit 43
b. *Basic Plumbing*, Unit 52

Tools and Equipment:

a. Force cup
b. Main cleaning rod
c. Roto rooter
d. Test plugs
e. Source of air pressure

CLASSROOM HOURS 6

EVALUATION (P-36)

a. Given tools, supplies and a clogged drain situation, the student will locate and dislodge obstructing material. Drains throughout the system must run free.

b. Review Questions, Plumbing I, Unit 43

c. Review Questions, Basic Plumbing, Unit 52

TASK

P-37 Removing obstructions from water closet drains

PERFORMANCE OBJECTIVE

Clear obstruction from clogged water closet.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Fixture traps
b. Tools and materials for clearing drains
c. Installing a water closet

Provide Demonstration On:

a. Using a closet auger
b. Using a force cup
c. Removing and installing water closet

Provide Practical Application On:

a. Using a closet auger
b. Removing and installing toilet

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day

A/Vs:

a. Audio Active, lesson 5; tape 2, side 1
b. Audio Active, lesson 11; tape 5, side 1

Student Manuals:

a. Plumbing I, Unit 42
b. Basic Plumbing, Unit 51

Tools and Equipment:

a. Force cup
b. Closet auger
c. Fixture installation kit
d. Wax ring

CLASSROOM HOURS 3

EVALUATION (P-37)

a. Given tools, supplies and a clogged toilet in mock-up, the student will remove obstruction to make water closet fully operable. There must be no leaks, scratches or marrs.

b. Review Questions, Plumbing I, Unit 42

c. Review Questions, Basic Plumbing, Unit 51

TASK

P-38 Replacing lavatory trap drains

PERFORMANCE OBJECTIVE

Replace slip-joint washers on lavatory "P"-trap.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Fixture traps
b. Fixture drain trap tools
c. Fixture repair

Provide Demonstration On:

"P"-trap assembly

Provide Practical Application On:

a. Repairing "P"-trap
b. Installing "P"-trap

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day

A/Vs:

Audio Active, lesson 10; tape 5, side 2

Student Manuals:

a. Plumbing I, Unit 50
b. Basic Plumbing, Unit 57

Tools and Equipment:

a. Slip-joint wrench
b. Slip-joint washers

CLASSROOM HOURS 4

EVALUATION (P-38)

a. Given tools and materials, the student will replace slip-joint washers on lavatory "P"-trap. Chromed surfaces must not be scratched or marred and the joints must not leak.

b. Review Questions, Plumbing I, Unit 50

c. Review Questions, Basic Plumbing, Unit 57

TASK

P-39 Repairing leaking shower valves

PERFORMANCE OBJECTIVE

Perform repairs to shower valves that will eliminate leaks.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Compression valve characteristics
b. Repairing shower valves
c. Valve reseating

Provide Demonstration On:

a. Shower and diverting valves
b. Replacing "O" rings
c. Replacing valve body seats
d. Replacing stem washers

Provide Practical Application On:

a. Rebuilding shower valve
b. Hydronic testing

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day

A/Vs:

Audio Active, lesson 18; tape 9, side 2

Student Manuals:

a. *Plumbing I*, Unit 51
b. *Basic Plumbing*, Unit 53

Tools and Equipment:

a. Fixture installation kit
b. Valve reseating kit
c. Valve seat kit
d. "O" ring kit

CLASSROOM HOURS

6

EVALUATION (P-39)

a. Given tools, supplies and a hydronic work and test station, the student will disassemble, inspect and repair a shower valve. The repaired valve must not leak at test bench pressure, have no missing parts and brightly finished surfaces should not be scratched or marred.

b. Review Questions, Basic Plumbing, Unit 53

TASK

P-40 Repairing leaking faucets and valves

PERFORMANCE OBJECTIVE

Repair faucets and compression type valves.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose, function and characteristics of compression type valves
b. Tools and repair kits for compression valves
c. Where internal and external leaks may occur

Provide Demonstration On:

a. Disassembling valves
b. Inspecting for wear or damage
c. Seating/reseating procedures

Provide Practical Application On:

a. Disassembling, inspecting and repairing seats, stems, glands and bonnets
b. Hydronic testing

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day

A/Vs:

Audio Active, lesson 5; tape 3, side 1

Student Manuals:

a. Plumbing I, Unit 51
b. Basic Plumbing, Unit 53

Tools and Equipment:

a. Adjustable wrench
b. Faucet and valve repair kit
c. Seat assortment kit
d. Washer assortment kit
e. "O" ring assortment kit

CLASSROOM HOURS 6

EVALUATION (P-40)

a. Given tools, supplies and a hydronic work and test station, the student will disassemble, inspect, repair and reassemble a faucet valve. The repaired valve must have no internal or external leaks, no missing parts and must work easily by hand.

b. Review Questions, Plumbing I, Unit 51

c. Review Questions, Basic Plumbing, Unit 53

TASK

P-41 Repairing water flush valves on water closets

PERFORMANCE OBJECTIVE

Repair ball cock and flush valve.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Purpose, function and characteristics of ball cock valves
b. Repair procedures

Provide Demonstration On:

a. Operation and adjustments of ball cock
b. Leaks and failure points

Provide Practical Application On:

a. Disassembling
b. Inspecting ball cock and flush valve
c. Repairing ball cock and flush valve
d. Adjusting ball cock and flush valve
e. Assembling and testing

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Walters and Ferrell
d. Day

Student Manuals:

Plumbing I, Unit 29

Tools and Equipment:

a. Valve service tool kit
b. Washer assortment kit
c. "O" ring assortment kit

CLASSROOM HOURS 4

EVALUATION (P-41)

a. Given tools, supplies and a hydronic work and test station, the student will repair and adjust a water closet flush valve. The repaired valve must not leak at test bench pressure or at closet tank outlet. Closet flush valve must have no excessive binding of moving parts.

b. Review Questions, Plumbing I, Unit 29

TASK

P-42 Replacing a section of water supply line

PERFORMANCE OBJECTIVE

Replace a section of water supply line.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Isolating a section of line
b. Cutting water lines in place
c. Purpose and characteristics of pipe unions
d. Measuring and fitting allowance
e. Threading pipe

Provide Demonstration On:

a. Multi cutter wheel pipe cutter
b. Calculating fitting allowance
c. Using two pipe wrenches
d. Threading pipe

Provide Practical Application On:

a. Cutting pipe with 3 wheel cutter
b. Cutting pipe with hacksaw
c. Calculating fitting allowance
d. Threading pipe
e. Joining pipe

INSTRUCTIONAL MATERIALS

Textbooks:

a. Slater
b. Oravetz
c. Day
d. Matthais and Smith

A/Vs:

a. Audio Active, lesson 3; tape 2, side 1
b. Audio Active, lesson 5; tape 3, side 1
c. Georgia, BPP-3

Student Manuals:

a. Plumbing I, Units 5, 6 and 12
b. Basic Plumbing, Units 8 and 17
c. Georgia, Units BPP-3 BPP-4

Tools and Equipment:

a. Pipe cutter
b. Hacksaw
c. Pipe wrenches
d. Thread sealant

CLASSROOM HOURS

6

EVALUATION (P-42)

a. Given tools, supplies and a water supply line, the student will cut, remove and replace a section between fittings. The replaced section must not leak at fittings. The cut pipe must not exceed ± 1/16" mating ends.

b. Review Questions, Basic Plumbing, Units 8 and 17

c. Review Questions, Plumbing I, Units 5, 6 and 12

TASK

EL-01 Identifying basic electrical theory

PERFORMANCE OBJECTIVE

Define the theory and nature of electricity.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. The atom
b. Lightning
c. Types of insulators
d. Types of conductors
e. Direct current
f. Alternating current
g. Defining volts
h. Defining watts
i. Defining amperes
j. Describing loads
k. Calculating loads
l. Defining electrical terms
m. Ohm's law
n. Types of connections
o. Types of splices
p. Making splices

Provide Demonstration On:

Making connections and splices

Provide Practical Application On:

a. Draw two atoms, one positive, one negative.
b. Work problems using Ohm's law.
c. Work problems using power formula.
d. Figure voltage drop using Ohm's law and resistance formula.
e. Make several types of connection and splices.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Alerich
c. AAVIM, Understanding Electricity and Electrical Terms

A/Vs:

a. Georgia, slide set RW-1a [Industrial Electricity (IE)]
b. Georgia, slide set EL-01a [Refrigeration, Heating and Air-Conditioning (RHAC)]
c. Prentice-Hall Media, VD 1240

Student Manuals:

a. Georgia, Units RW-1a and RW-7a (IE)
b. Georgia, Units BET 1-10 [Residential Wiring (RW)]
c. Georgia, Unit EL-01a (RHAC)

Tools and Equipment:

(continued on back)

CLASSROOM HOURS

5

EVALUATION (EL-01)

Given an overview of basic electrical theory, the student will describe, diagram and define essential terms and elements, make connections and splices, identify types of flow and determine where and why each is utilized and calculate loads using Ohm's law and the power formula. All tasks must be in accordance with the instructor's specifications.

INSTRUCTIONAL MATERIALS (Continued)

Tools and Equipment:

a. Selection of wires
b. Wire strippers

TASK

EL-02 Installing a single 115 volt duplex outlet

PERFORMANCE OBJECTIVE

Wire a single 115 volt duplex convenience outlet which conforms to NEC standards.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of circuits
b. Types of outlets
c. Types of conductors
d. Designing the circuit
e. Diagramming the circuit
f. The NEC
g. Using electric meters
h. Selection of materials
i. Selection of tools
j. Types of splices
k. Wiring the circuit
l. Safety

Provide Demonstration On:

Using voltohmmeter

Provide Practical Application On:

a. Diagram a circuit for a 115 volt duplex outlet.
b. Wire a 115 volt duplex outlet.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mix
b. AAVIM, Electrical Wiring

A/Vs:

a. Georgia, slide set W-22 [Construction Cluster (CC)]
b. Georgia, slide sets REW-01a and EL-03b (RHAC)
c. Prentice-Hall Media, VDT 736, 737 and 738

Student Manuals:

a. Georgia, Unit VO-1 (CC)
b. Georgia, Unit REW-01 (RHAC)

Tools and Equipment:

(continued on back)

CLASSROOM HOURS 2

EVALUATION EL-02

Given necessary tools, supplies and equipment, the student will wire a single 115 volt duplex convenience outlet which conforms to NEC standards

INSTRUCTIONAL MATERIALS (continued)

Tools and Equipment:

a. Duplex receptacle
b. Wire
c. Screws
d. Screwdriver
e. Voltohmmeter
f. Wire stripper
g. NEC Handbook

TASK

EL-03 Wiring multiple convenience outlets

PERFORMANCE OBJECTIVE

Diagram, identify and wire a circuit with multiple convenience outlets.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of circuits
b. Types of outlets
    1. Convenience
    2. Appliance
c. Designing the circuit
d. Diagramming the circuit
e. Selection of materials
f. Selection of tools
g. Types of splices
h. Safety
i. Wiring the circuit

Provide Demonstration On:

Designing a circuit with multiple convenience outlets

Provide Practical Application On:

Diagram and wire a circuit with multiple convenience outlets.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mix
b. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide sets REW-02a, 02b and 02c (RHAC)

Student Manuals:

a. Georgia, Unit VO-2 (CC)
b. Georgia, Unit REW-02 (RHAC)

Tools and Equipment:

a. Receptacles
b. Wire
c. Screws
d. Screwdriver
e. Voltohmmeter
f. Wire stripper
g. NEC Handbook

CLASSROOM HOURS

2

EVALUATION (EL-03)

Given appropriate tools, supplies and equipment, the student will design, diagram and wire a circuit with multiple convenience outlets. The circuit must conform to NEC standards.

TASK

EL-04 Wiring a switch controlled convenience outlet

PERFORMANCE OBJECTIVE

Wire a switch controlled convenience outlet.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of switches
b. How a switch operates
c. Selection of switches
d. Designing the circuit
e. Diagramming the circuit
f. Selection of materials
g. Safety in wiring switches
h. Wiring a circuit with a switch

Provide Demonstration On:

Wiring a switch controlled convenience outlet

Provide Practical Application On:

Wire a switch controlled convenience outlet.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Alerich
c. Mix

A/Vs:

a. Georgia, slide set REW-03a (RHAC)
b. Georgia, slide sets RW-1-1 through RW-1-7 (IE)

Student Manuals:

a. Georgia, Unit VO-3 (CC)
b. Georgia, Unit REW-03a (RHAC)
c. Georgia, Unit RW-1 (IE)

Tools and Equipment:

(continued on back)

CLASSROOM HOURS

2

EVALUATION (EL-04)

Given appropriate tools, materials and supplies, the student will wire a switch controlled convenience outlet according to NEC standards.

INSTRUCTIONAL MATERIALS (Continued)

Tools and Equipment:

a. Receptacles
b. Switches
c. Wire
d. Screws
e. Screwdriver
f. Voltohmmeter
g. Wire stripper
h. NEC Handbook

TASK

EL-05 Installing three-wire branch circuits

PERFORMANCE OBJECTIVE

Install three-wire branch circuits.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Small appliance circuits for kitchen and laundry
b. Three-wire branch circuit for fixed application
c. Branch circuits for a bathroom heater vent light and receptacles using GFCL
d. Branch circuits for 220-230 volt major appliances

Provide Practical Application On:

a. Wire small appliance branch circuits for the kitchen.
b. Wire branch circuits for fixed appliances.
c. Wire a bathroom heater vent light using GFCL.
d. Install a 230v branch circuit for a dryer.

INSTRUCTIONAL MATERIALS

Textbooks:

a. NEC Handbook
b. AAVIM, Electrical Wiring

A/Vs:

a. Georgia, slide sets RW-12-1, RW-12-2, RW-14-1, RW-15-2, RW-15-3 and RW-22-B-1 (IE)
b. NEC, tape 22-side 2 (IE)

Student Manuals:

a. Georgia, Units RW-13, RW-14 and RW-15 (IE)
b. NEC Handbook, Units 6 48 (IE)

Tools and Equipment:

(continued on back)

CLASSROOM HOURS

2

EVALUATION (EL-05)

Given appropriate tools, supplies and equipment, the student will correctly wire 115v branch circuits as required for receptacles and fixed appliances for a residence. The finished product must be in accordance with NEC standards.

INSTRUCTIONAL MATERIALS (Continued)

Tools and Equipment:

a. Small appliances, fixed appliances, bathroom heater vent light
b. Receptacles
c. Conductor
d. Wire strippers, pliers, screwdriver, tape measure
e. Wire nuts
f. Voltohmmeter

TASK

EL-06 Identifying code requirements for a small appliance circuit

PERFORMANCE OBJECTIVE

Identify code requirements for a small appliance circuit.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Branch circuits required
   1. Section 220-2, NEC
   2. Small appliance branch circuits
   3. Laundry branch circuits

b. Load evenly proportioned among branch circuits

Provide Practical Application On:

Diagram a small appliance receptacle circuit on a kitchen floor plan.

INSTRUCTIONAL MATERIALS

Textbooks:

a. NEC Handbook
b. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide sets RW-12-1 and RW-12-2 (IE)

Student Manuals:

Georgia, Unit RW-12 (IE)

Tools and Equipment:

Kitchen floor plan

CLASSROOM HOURS

2

EVALUATION (EL-06)

Given an overview of NEC codes for small appliance circuits, the student will correctly diagram all necessary small appliance circuits on a kitchen floor plan. The diagram must be in accordance with NEC standards.

TASK

EL-07 Installing split switched receptacles

PERFORMANCE OBJECTIVE

Design and install split and switched receptacles.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Difference between a switched receptacle and a convenience outlet
b. Designing a switched receptacle
c. Installing a switched receptacle
d. Installing a split switched receptacle

Provide Demonstration On:

Designing a switched receptacle

Provide Practical Application On:

a. Install a split switched receptacle.
b. Install a split receptacle.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Smith
b. AAVIM, Electrical Wiring
c. Alerich

A/Vs:

Georgia, slide sets REW-04a and REW-04b (RHAC)

Student Manuals:

Georgia, Unit REW-04 (RHAC)

Tools and Equipment:

a. Wire strippers
b. Split switched receptacle
c. Screwdriver
d. Pliers
e. Voltohmmeter

CLASSROOM HOURS

2

EVALUATION (EL-07)

Given appropriate tools, supplies and equipment, the student will design and install split and switched receptacles according to the instructor's requirements.

TASK

EL-08 Installing a circuit with four receptacles and one single pole switch

PERFORMANCE OBJECTIVE

Install a circuit with four receptacles and one single pole switch.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Feeders
   1. Diagramming feeder and branch circuits
   2. Maximum voltage drop for feeders
b. Common neutral feeder
c. Overcurrent protection
d. Determining feeder size
e. Voltage drop formula
f. Continuous load
g. Noncoincident load
h. Maximum distance between receptacles in a residence
i. Minimum number of small appliance circuits for a residence
j. Feeder and service allowance for small appliance circuits
k. Calculating load
l. Designing a circuit with four receptacles and one sp switch
m. Wiring the circuit
n. Wiring four receptacle in parallel with one receptacle controlled by two three-way switches

Provide Practical Application On:

Wire a circuit with four receptacles and one sp switch so that three receptacles are hot and one is controlled by a single-pole switch.

INSTRUCTIONAL MATERIALS

Textbooks:

NEC Handbook

A/Vs:

a. Georgia, slide sets RW-7-1, RW-7-2 and RW-7-3 (IE)
b. NEC, tape 3 - side 2 and tape 4 - side 1 (IE)

Student Manuals:

a. Georgia, Unit RW-7 and RW-8 (IE)
b. NEC Handbook, Units 5 and 6 (IE)

Tools and Equipment:

a. Receptacles
b. Switches
c. Wire
d. Wire strippers
e. Pliers
f. Screwdriver
g. Voltohmmeter

CLASSROOM HOURS

2

EVALUATION (EL-08)

Given appropriate tools, supplies and equipment, the student will design, diagram and wire a circuit with four receptacles and one single pole switch with three receptacles always hot and one controlled by the switch. All installations will be in accordance with NEC standards.

TASK

EL-09 Installing five receptacles on a split circuit

PERFORMANCE OBJECTIVE

Install five receptacles on a split circuit

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Reason for splitting a receptacle
b. Split circuits
c. Installing split circuits

Provide Demonstration On:

Removing a break-out link from a receptacle

Provide Practical Application On:

Wire a split circuit with five receptacles and one split switch so that the top half of each receptacle is controlled by a switch and the bottom half remains hot.

INSTRUCTIONAL MATERIALS

Textbooks:

AAVIM, Electrical Wiring

A/Vs:

Georgia, slide set RW-9-1 (IE)

Student Manuals:

Georgia, Unit RW-9 (IE)

Tools and Equipment:

a. Receptacles
b. Single pole switch
c. Wire
d. Wire strippers
e. Pliers
f. Screwdriver
g. Voltohmmeter

CLASSROOM HOURS

3

EVALUATION (EL-09)

Given appropriate tools, supplies and equipment, the student will design and wire a circuit within five receptacles and one split switch with the top half of each receptacle controlled by the switch and the bottom half remaining hot. All installations will be in accordance with NEC specifications.

TASK

EL-10 Wiring one light with a single pole switch and one outlet

PERFORMANCE OBJECTIVE

Diagram, identify and wire a circuit with one light controlled by a single pole switch and one hot convenience outlet.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of single pole switches
b. Types of outlets
c. Wiring combinations
d. Designing the circuit
e. Diagramming the circuit
f. Selection of materials
g. Wiring combination of single pole switch and outlets

Provide Demonstration On:

Wiring combination of single pole switch and hot outlets

Provide Practical Application On:

Wire a combination of a single pole switch and one outlet.

INSTRUCTIONAL MATERIALS

Textbooks:

a. MIX
b. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide set W-25 (CC)

Student Manuals:

Georgia, Unit OL-1 (CC)

Tools and Equipment:

a. Single pole switch
b. Receptacle
c. Wire
d. Wire strippers
e. Screwdriver
f. Voltohmmeter
g. NEC Handbook

CLASSROOM HOURS

CLASSROOM HOURS	2

EVALUATION (EL-10)

Given appropriate tools, supplies, and equipment, the student will wire one light with a single pole switch and one outlet in accordance with NEC standards.

TASK

EL-11 Wiring a lighting circuit with a single pole switch

PERFORMANCE OBJECTIVE

Draw, identify and wire a simple lighting circuit with a single pole switch.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of switches
b. Types of overhead lighting
c. Designing the circuit
d. Diagramming the circuit
e. Selection of materials
f. Wiring the circuit

Provide Demonstration On:

Wiring a single pole switch

Provide Practical Application On:

Wire a lighting circuit with a single pole switch.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, Maintaining the Lighting and Wiring System

A/Vs:

Georgia, slide set W-24 (CC)

Student Manuals:

Georgia, Unit OL-1 (CC)

Tools and Equipment:

a. Single pole switches
b. Light box
c. Wire
d. Screws
e. Screwdriver
f. Voltohmmeter
g. Wire stripper
h. NEC Handbook

CLASSROOM HOURS

2

EVALUATION (EL-11)

Given appropriate tools, supplies and equipment, the student will wire a circuit with one light and a single pole switch in accordance with NEC standards.

TASK

EL-12 Wiring two lights with a single pole switch

PERFORMANCE OBJECTIVE

Diagram, identify and wire a circuit with one single pole switch and two lights.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of single pole switches
b. Types of overhead lighting
c. Wiring lights in parallel
d. Designing the circuit
e. Diagramming the circuit
f. Selection of materials
g. Wiring a single pole switch with more than one load

Provide Practical Application On:

Wire a single pole switch with two lights in parallel.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mix
b. AAVIM, Electrical Wiring

A/Vs:

a. Georgia, slide set W-25 (CC)
b. Georgia, slide sets REW-03a and REW-03b (RHAC)
c. Georgia, slide sets Rw-2-1, RW-3-3 and RW-4a-1 (IE)
d. Prentice-Hall Media, VDT 739, 740 and 741

Student Manuals:

a. Georgia, Unit OL-2 (CC)
b. Georgia, Unit REW-03a (RHAC)
c. Georgia, Units RW-2, RW-2a, RW-3 and RW-4a (IE)

Tools and Equipment:

(continued on back)

CLASSROOM HOURS

2

EVALUATION (EL-12)

Given appropriate tools, supplies and equipment, the student will wire a circuit with a single pole switch and two lights in accordance with NEC standards.

INSTRUCTIONAL MATERIALS (Continued)

Tools and Equipment:

a. Single pole switches
b. Lighting boxes
c. Wires
d. Screwdriver
e. Wire strippers
f. Voltohmmeter
g. NEC Handbook

TASK

EL-13 Wiring two three-way switches

PERFORMANCE OBJECTIVE

Diagram, identify and wire two three-way switches that control one light.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of three-way switches
b. Connecting three-way switches
c. Designing a circuit for a three-way switch
d. Selection of materials
e. Wiring a three-way switch

Provide Practical Application On:

Wire a circuit with a three-way switch which controls one light.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, Maintaining the Lighting and Wiring System
c. AAVIM, Electrical Wiring

A/Vs:

a. Georgia, slide set W-26 (CC)
b. Georgia, slide set REW-06a (RHAC)
c. Georgia, slide sets RW-4-1 and RW-4-2 (IE)

Student Manuals:

a. Georgia, Unit OL-3 (CC)
b. Georgia, Unit REW-06 (RHAC)
c. Georgia, Unit RW-4 (IE)

Tools and Equipment:

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CLASSROOM HOURS 2

EVALUATION (EL-13)

Given appropriate tools, supplies and equipment, the student will design, diagram and wire a circuit with two three-way switches which controls one light and is in accordance with NEC standards.

INSTRUCTIONAL MATERIALS (Continued)

Tools and Equipment:

a. Three-way switch
b. Light box
c. Voltohmmeter
d. Wire
e. Wire strippers
f. Screwdriver
g. Pliers

TASK

EL-14 Wiring two three-way switches with two lights

PERFORMANCE OBJECTIVE

Design, diagram and wire a circuit with two three-way switches which controls two lights.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying three-way switches
b. Wiring lights in parallel
c. Designing the circuit
d. Diagramming the circuit
e. Wiring multiple lights in parallel controlled by two three-way switches

Provide Practical Application On:

Wire two lights in parallel which are controlled by two three-way switches.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Mullin

A/Vs:

Georgia, slide set W-27 (CC)

Student Manuals:

Georgia, Unit OL-4 (CC)

Tools and Equipment:

a. Three-way switches
b. Light boxes
c. Voltohmmeter
d. Wire
e. Wire strippers
f. Screwdriver
g. Pliers

CLASSROOM HOURS	3

EVALUATION (EL-14)

Given appropriate tools, supplies and equipment, the student will design, diagram and wire a circuit with two lights which are controlled by two three-way switches in parallel. The circuit must be in accordance with NEC standards.

TASK

EL-15 Wiring a four-way switch which controls one light

PERFORMANCE OBJECTIVE

Diagram, identify and wire a circuit with a four-way switch and two three-way switches which controls one and two lights.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of four-way switches
b. Wiring three-way switches
c. Connecting three- and four-way switches
d. Wiring circuits in parallel
e. Designing a circuit with two three-way and one four-way switches controlling one light
f. Selection of materials
g. Wiring a circuit with two three-way switches and one four-way switch which controls one light

Provide Practical Application On:

Wire a circuit with two three-way switches and one four-way switch which controls one light.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, Maintaining the Wiring and Lighting System
c. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide set RW-5-1 and RW-6-1 (IE)

Student Manuals:

a. Georgia, Unit OL-5 (CC)
b. Georgia, Units RW-5 and RW-6 (IE)

Tools and Equipment:

a. Three-way switches
b. Four-way switches
c. Light boxes
d. Voltohmmeter
e. Wire strippers
f. Wire
g. Screwdriver
h. Pliers

CLASSROOM HOURS

2

EVALUATION (EL-15)

Given appropriate tools, supplies and equipment, the student will design, diagram and wire a circuit with a) one light and b) two lights controlled by one four-way switch and two three-way switches. The end product must be in accordance with NEC standards.

TASK

EL-16 Wiring a master switch

PERFORMANCE OBJECTIVE

Wire a circuit with a master switch and two three-way switches which control two lights.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Master switches
b. Connecting master switches
c. Designing a circuit with a master switch and two three-way switches which control two lights
d. Diagramming the circuit
e. Selection of materials
f. Wiring a master switch

Provide Practical Application On:

Wire a circuit with a master switch and two three-way switches which control two lights.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mix
b. AAVIM, *Electrical Wiring*

A/Vs:

Georgia, slide set W-29 (CC)

Student Manuals:

Georgia, Unit OL-6 (CC)

Tools and Equipment:

a. Master switch
b. Three-way switches
c. Light boxes
d. Voltohmmeter
e. Wire strippers
f. Screwdriver
g. Pliers

CLASSROOM HOURS

2

EVALUATION (EL-16)

Given appropriate tools, supplies and equipment, the student will design, diagram and wire a circuit with a master switch and two three-way switches which control two lights. The circuit must be in accordance with NEC standards.

TASK

EL-17 Wiring light fixtures

PERFORMANCE OBJECTIVE

Wire light fixtures.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of incandescent light fixtures
b. Types of splices
c. Wiring an incandescent light fixture
d. Selection of materials
e. Testing continuity
f. Wiring the fixture
g. Safety

Provide Practical Application On:

Wire a light fixture and test for continuity.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Alerich

A/Vs:

Georgia, slide set W-37 (CC)

Student Manuals:

Georgia, Unit LF-1 (CC)

Tools and Equipment:

a. Light fixture
b. Wire
c. Wire strippers
d. Screwdriver
e. Voltohmmeter
f. Pliers

CLASSROOM HOURS

2

EVALUATION (EL-17)

Given appropriate tools, supplies and equipment, the student will correctly wire an incandescent light fixture and test for continuity according to the instructor's requirements.

TASK

EL-18 Hanging light fixtures

PERFORMANCE OBJECTIVE

Hang a light fixture.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of light fixtures
b. Assembly of light fixtures
c. Mounting a light fixture
d. Selection of materials
e. Hanging a fixture

Provide Practical Application On:

Hang a light fixture.

INSTRUCTIONAL MATERIALS

Textbooks:

AAVIM, Electrical Wiring

A/Vs:

Georgia, slide set W-38 (CC)

Student Manuals:

Georgia, Unit LF-2 (CC)

Tools and Equipment:

a. Light fixture and hardware
b. Wire nuts
c. Pliers
d. Wrenches
e. Tape measure
f. Screwdrivers
g. Wire strippers

CLASSROOM HOURS

2

EVALUATION (EL-18)

Given a light fixture and hanging hardware, the student will correctly hang the light fixture according to the instructor's requirements.

TASK

EL-19 Identifying electrical symbols

PERFORMANCE OBJECTIVE

Identify and draw the electrical symbols described in the NEC Handbook.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of electrical symbols
b. Identifying electrical symbols
c. Drawing electrical symbols
d. Scales

Provide Practical Application On:

a. Match symbols to terms.
b. Draw several specified electrical symbols.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Mullin
c. Alerich

A/Vs:

a. Georgia, slide set REW-12a (RHAC)
b. Georgia, slide set RW-16a (IE)

Student Manuals:

a. Georgia, Unit REW-11 and REW-12 (RHAC)
b. Georgia, RW-16-A (IE)

Tools and Equipment:

NEC Handbook

CLASSROOM HOURS

4

EVALUATION (EL-19)

Given an overview of electrical symbols, the student will correctly identify and draw the symbols according to the instructor's requirements.

TASK

EL-20 Installing electrical symbols into a floor plan and estimating materials

PERFORMANCE OBJECTIVE

Install electrical symbols into a floor plan and estimate the materials.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of electrical symbols
b. Types of electrical fixtures
c. Types of electrical appliances
d. Identifying appropriate symbols
e. Locating and drawing symbols in correct position on floor plan
f. Estimating materials

Provide Practical Application On:

a. Using specifications, draw appropriate symbols on a floor plan.
b. Estimate materials needed for the job.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Alerich
b. Mullin
c. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide sets RW-32-1 and RW-32-2 (IE)

Student Manuals:

a. Georgia, Unit BPR-2 (CC)
b. Georgia, Unit RW-32 (IE)

Tools and Equipment:

a. Floor plans
b. Specifications
c. Pencils
d. NEC Handbook

CLASSROOM HOURS

4

EVALUATION (EL-20)

Given appropriate specifications and a floor plan, the student will correctly install electrical symbols into the floor plan. The product must meet the instructor's requirements.

TASK

EL-21 Identifying principles and application of transformers

PERFORMANCE OBJECTIVE

Identify principles and applications of transformers.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Transformers
b. Step-down and step-up transformers
c. Current in transformer indirectly proportioned to voltage ratio
d. Power in primary and power in secondary
e. Schematic for a transformer
f. Electro-magnetic induction
g. Turn ratio
h. Voltage ratio
i. Calculating formulas
j. True power vs. apparent power
k. Transformer efficiency

Provide Practical Application On:

Work problems using formulas for the following:

1. Power
2. Turns
3. Volts
4. Current

INSTRUCTIONAL MATERIALS

Textbooks:

a. Alerich
b. Mullin

Student Manuals:

Georgia, Units RW-27a and RW-27a-1 (IE)

CLASSROOM HOURS 2

EVALUATION (EL-21)

Given required formulas and data, the student will calculate ratios for power, turns, volts and current for a transformer according to the manufacturer's specifications.

TASK

EL-22 Wiring a low voltage transformer

PERFORMANCE OBJECTIVE

Wire a low voltage transformer.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of low voltage transformers
b. How a transformer operates
c. Determining transformer voltage
d. Location of transformer
e. How to connect a low voltage transformer
f. Testing the transformer

Provide Practical Application On:

Install wire and test a low voltage transformer.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, *Electrical Wiring*

A/Vs:

Georgia, slide set W-39 (CC)

Student Manuals:

Georgia, Unit LV-1 (CC)

Tools and Equipment:

a. Low voltage transformer
b. Voltohmmeter
c. Screwdrivers
d. Tape measures
e. Wire nuts
f. Cable
g. Pliers
h. Wire strippers

CLASSROOM HOURS 2

EVALUATION (EL-22)

Given appropriate tools, supplies and equipment, the student will correctly locate, install and wire a low voltage transformer. Installation and wiring must meet instructor's requirements.

TASK

EL-23 Installing a push button switch

PERFORMANCE OBJECTIVE

Install a push button switch for a doorbell circuit.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of low voltage switches
b. How a low voltage switch operates
c. Installing a push button switch

Provide Demonstration On:

Mounting a doorbell switch

Provide Practical Application On:

Install a low voltage push button switch.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. Mix
c. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide set W-40 (CC)

Student Manuals:

Georgia, Unit LV-2 (CC)

Tools and Equipment:

a. Doorbell switch
b. Wire
c. Screwdriver
d. Wire stripper
e. Saw
f. Tape measure
g. Voltohmmeter
h. Hammer
i. Chisel

CLASSROOM HOURS 1

EVALUATION (EL-23)

Given appropriate tools, supplies and equipment, the student will correctly install and wire a low voltage push button switch and test the switch. Installation and wiring must meet instructor's requirements.

TASK

EL-24 Installing bells and chimes

PERFORMANCE OBJECTIVE

Install a doorbell circuit with either bells or chimes.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of bells and chimes
b. Installing bells and chimes and connecting them to low voltage push button switch and transformer
c. Installing the low voltage, push button switch
d. Installing the low voltage transformer

Provide Practical Application On:

Install a doorbell circuit using either bells or chimes.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. Mix
c. AAVIM, Electrical Wiring

A/Vs:

a. Georgia, slide set W-4 (CC)
b. Georgia, slide set REW-05a (RHAC)
c. Georgia, slide set RW-23-1 (IE)

Student Manuals:

a. Georgia, Unit LV-3 (CC)
b. Georgia, Unit REW-05 (RHAC)
c. Georgia, Unit RW-23 (IE)

Tools and Equipment:

(continued on back)

CLASSROOM HOURS

1

EVALUATION (EL-24)

Given appropriate tools, supplies and equipment, the student will install a doorbell circuit using either bells or chimes. Installation must meet instructor's requirements.

INSTRUCTIONAL MATERIALS (Continued)

Tools and Equipment:

a. Low voltage push button switch
b. Transformer
c. Cable
d. Bells or chimes
e. Screwdriver
f. Tape measure
g. Wire nuts
h. Voltohmmeter
i. Wire
j. Chisel
k. Wire stripper
l. Saw
m. Hammer

TASK

EL-25 Wiring special low voltage circuits

PERFORMANCE OBJECTIVE

Wire special voltage circuits.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Wiring intercom systems
b. Wiring burglar alarm systems
c. Installing low voltage remote control lighting system
d. Installing low voltage wire

Provide Practical Application On:

a. Wire an intercom system.
b. Wire an open circuit. burglar alarm system.
c. Wire a remote control lighting system.

INSTRUCTIONAL MATERIALS

Textbooks:

Alerich

A/Vs:

Georgia, slide sets RW-24-1, RW-25-1, RW-26-1 through RW-26-8, RW-29-A, B, C, D and E (IE)

Student Manuals:

Georgia, Units RW-24, RW-25 and RW-26 (IE)

Tools and Equipment:

(continued on back)

CLASSROOM HOURS 1

EVALUATION (EL-25)

Given appriproate tools, supplies and equipment, the student will install an intercom system, a burglar alarm system and a remote control low voltage lighting system according to manufacturer's specifications.

TASK

EL-26 Connecting 220 volt grounded outlets

PERFORMANCE OBJECTIVE

Wire and connect a 220 volt grounded outlet in the entrance switch box.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. 220 volt grounded outlets
b. Utility box installation
c. Types of wires
d. Pulling wires
e. Types of entrance switches
f. Testing with VOM

Provide Demonstration On:

Installing a utility box

Provide Practical Application On:

Wire a 220v outlet.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, Electrical Wiring

A/Vs:

a. Georgia, slide set W-19 (CC)
b. Georgia, slide set REW-07a (RHAC)

Student Manuals:

a. Georgia, Unit GC-1 (CC)
b. Georgia, Unit REW-07 (RHAC)

Tools and Equipment:

a. 220v receptacle
b. Wire
c. Voltohmmeter
d. Wire strippers
e. Pliers
f. Wire nuts
g. Fast tape
h. NEC Handbook

CLASSROOM HOURS 2

EVALUATION (EL-26)

Given appropriate tools, supplies and equipment, the student will correctly wire a 220 volt receptacle according to NEC specifications.

TASK

EL-27 Wiring a hot water heater

PERFORMANCE OBJECTIVE

Wire a 220 volt hot water heater.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of electric hot water heaters
b. Wiring electrical connections for a hot water heater
c. Wiring entrance switch
d. Wiring the hot water heater
e. Safety

Provide Demonstration On:

Making connections on an electric hot water heater

Provide Practical Applications On:

a. Wire an entrance switch.
b. Wire a hot water heater.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, Electrical Wiring
c. NEC Handbook

A/Vs:

a. Georgia, slide set W-20 (CC)
b. Georgia, slide sets RW-14-1, RW-22-1, RW-22-2 and RW-22-3 (IE)

Student Manuals:

a. Georgia, Unit GC-2 (CC)
b. Georgia, Units RW-14 and RW-22 (IE)

Tools and Equipment:

a. Hot water heater
b. Cable
c. Wire strippers
d. Screwdriver
e. Pliers

CLASSROOM HOURS 1

EVALUATION (EL-27)

Given appropriate tools, supplies and equipment, the student will wire a hot water heater according to NEC specifications.

TASK

EL-28 Wiring ranges

PERFORMANCE OBJECTIVE

Wire a range or junction box.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of ranges
b. Types of wire
c. Types of boxes
d. How to connect a range
e. How to connect a junction box
f. Selection of materials

Provide Practical Application On:

Wire a range or a junction box.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, Electrical Wiring

A/Vs:

a. Georgia, slide set W-21 (CC)
b. Georgia, slide sets RW-16-1, RW-16-2, RW-17-1 and RW-17-2 (IE)
c. Georgia, slide set MA-01a (RHAC)

Student Manuals:

a. Georgia, Unit GC-3 (CC)
b. Georgia, Units RW-16 and RW-17 (IE)

Tools and Equipment:

a. Range
b. Junction box
c. Screwdrivers
d. Wire strippers
e. Wire
f. Voltohmmeter
g. NEC Handbook
h. Pliers

CLASSROOM HOURS

1

EVALUATION (EL-28)

Given appropriate tools, supplies and equipment, the student will correctly wire a range according to NEC standards.

TASK

EL-29 Wiring baseboard-type wall heaters

PERFORMANCE OBJECTIVE

Wire baseboard-type wall heaters for both 110 volts and 220 volts.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying special purpose outlets
b. Grounding type receptacles
c. Calculating the load for a special purpose outlet and designing circuits
d. Making proper grounding connections
e. Using armored cable and non-metallic sheathed cable
f. Grounding provisions on heater units
g. Testing for grounding continuity between grounded outlet box and grounding circuit receptacle

Provide Demonstration On:

Wiring circuits for grounding type receptacles

Provide Practical Application On:

Wire a grounding type receptacle for a baseboard-type heater unit.

INSTRUCTIONAL MATERIALS

Textbooks:

Mullin

A/Vs:

a. Georgia, slide set W-30 (CC)
b. Georgia, slide sets W-18-1,2,3,4 and 5 (IE)

Student Manuals:

a. Georgia, Unit EH-1 (CC)
b. Georgia, Unit RW-18 (IE)

Tools and Equipment:

a. Grounding type receptacle
b. Conductors
c. Wire strippers
d. Screwdrivers
e. Voltohmmeter
f. Heater
g. Pliers

CLASSROOM HOURS

1

EVALUATION (EL-29)

Given appropriate tools, supplies and equipment, the student will wire a grounding type receptacle for a baseboard-type heater unit and test for continuity. The task must be completed according to the instructor's specifications.

TASK

EL-30 Installing a 230 volt central heating or cooling circuit and disconnect

PERFORMANCE OBJECTIVE

Install a 230 volt central heating or cooling circuit and disconnect.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Maximum loads for motor operated and combination loads
b. Calculating load and determining wire size for a heating and cooling system
c. Exceptions to maximum load for heating units
d. Disconnecting means for heater
e. Supplementary over-current protectors
f. Marking of heating and air conditioning equipment
g. Installing a 230v window A/C unit

INSTRUCTIONAL MATERIALS

Textbooks:

a. NEC Handbook
b. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide sets RW-19-1 and RW-20-1 (IE)

Student Manuals:

Georgia, Units RW-19 and RW-20 (IE)

Tools and Equipment:

a. Wire
b. Fused disconnect
c. Breakers
d. Voltohmmeter
e. Wire strippers
f. Screwdriver
g. Wire nuts
h. Pliers

CLASSROOM HOURS 4

EVALUATION (EL-30)

Given the electrical specifications for a heating system, the student will be able to calculate the load and determine wire size and overcurrent protection requirements to wire a heater and disconnect. The completed task must be in accordance with NEC specifications.

TASK

EL-31 Calculating loads

PERFORMANCE OBJECTIVE

Calculate range, heating and total load for a residence.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Review NEC article 220
b. Calculating range load
c. Calculating heating and cooling loads
d. Calculating fixed appliance load
e. Small appliance branch circuit loads
f. Total load calculation
g. Writing service entrance and branch circuit specification for a residence from a blueprint

Provide Practical Application On:

a. Calculate total load for a residence.
b. Write specification for service entrance and brand circuits from blueprint.

INSTRUCTIONAL MATERIALS

Textbooks:

a. NEC Handbook
b. AAVIM, Electrical Wiring

A/Vs:

Georgia, slide sets RW-14-1, RW-28-1, RW-31-1 and RW-31-2 (IE)

Student Manuals:

Georgia, Units RW-13A, RW-13A-1 and RW-28 (IE)

Tools and Equipment:

Blueprints of residence

CLASSROOM HOURS 4

EVALUATION (EL-31)

Given total dimensions for a residence and small appliance, heating, cooling and range load for the residence, the student will calculate the total load for the residence according to the instructor's requirements.

TASK

EL-32 Calculating wire size and voltage drop

PERFORMANCE OBJECTIVE

Calcuate wire size and voltage drop.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Insulation requirements
b. Properties of conduction
c. Mechanical strength of conductors
d. Three-wire single phase residential service
e. Type MC cable
f. Bare conductors
g. Mineral-insulated mineral-sheathed cable
h. Type MTW machine tool wire
i. More than three conductors in a raceway or cable
j. Overcurrent protection
k. Neutral conductor
l. Grounding conductor
m. Voltage drop factors
n. Wire size factors
o. Formula
p. Power loss

INSTRUCTIONAL MATERIALS

Textbooks:

a. NEC Handbook
b. AAVIM, Electrical Wiring
c. Alerich

A/Vs:

Georgia, slide set RW-13B-1 and RW-13B-2 (IE)

Student Manuals:

Georgia, Units RW-13-B and RW-20-A (IE)

CLASSROOM HOURS

2

EVALUATION (EL-32)

Given appropriate NEC data for allowable ampacities and properties of conductors, the student will calculate wire size and voltage drop requirements for a given circuit. The calcuations must meet the instructor's satisfaction.

TASK

EL-33 Making calculations for three-wire branch circuits

PERFORMANCE OBJECTIVE

Make calculations for three-wire branch circuit.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Phase (define)
b. Alternating current
c. Comparing voltage to time
d. Comparing voltage to voltage
e. Out-of-phase voltage
f. Common three-wire branch circuits
g. Balanced system
h. Over-loaded neutral
i. Procedure for connecting a three-wire circuit

Provide Practical Application On:

Make calculations necessary for designing a three-wire circuit.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Mullin
c. NEC Handbook

Student Manuals:

a. Georgia, Unit RW-10-A (IE)
b. Georgia, Unit NEC-4 (IE)

CLASSROOM HOURS 2

EVALUATION (EL-33)

Given appropriate formulas and procedures, the student will make all necessary calculations for three-wire circuits according to the instructor's requirements.

TASK

EL-34 Selecting conduit for service entrance

PERFORMANCE OBJECTIVE

Determine the proper size and type of conduit for an ordinary service entrance.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of conduit
b. Uses of conduit
c. Mounting service entrance conduit
d. Identifying service entrance supporting
e. Bending conduit (thin wall)
f. Measuring thin wall conduit
g. Bending thin wall conduit
h. Connecting thin wall conduit
i. Threading thin wall conduit
j. Connecting rigid conduit
k. Installing rigid conduit supporting
l. Safety

Provide Practical Application On:

Mount service entrance conduit.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Mullen

A/Vs:

a. Georgia, slide set REW-08b (RHAC)
b. Georgia, slide sets W-4, W-33, W-34, W-35 and W-36 (CC)

Student Manuals:

a. Georgia, Unit TE-4 (CC)
b. Georgia, Units C-1 and C-4 (CC)

Tools and Equipment:

a. Conduit
b. Mounting hardware
c. Conduit (tubing) bender
d. Drill
e. Screwdriver
f. Pliers

CLASSROOM HOURS

2

EVALUATION (EL-34)

Given appropriate tools, supplies and equipment, the student will select the proper size conduit and observe proper mounting. Procedures and all safety precautions must meet the instructor's satisfaction.

TASK

EL-35 Installing an electrical service entrance for single-phase power

PERFORMANCE OBJECTIVE

Install an electrical service entrance for single-phase power.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Locating the service entrance
b. Identifying meter bases
c. Installing a meter base
d. Laying out and drilling holes for service entrance
e. Identifying and installing masts
f. Identifying and installing roof boots
g. Identifying sizes and types of conductors
h. Selecting conductors
i. Pulling conductors
j. Installing a weatherhead
k. Methods of grounding
l. Coordinating installation with local power company
m. Drip loops
n. Fuse box and connections
o. Safety

Provide Practical Application On:

Install an electrical service entrance for single-phase power.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Mullin
c. Alerich
d. Mix

A/Vs:

a. Georgia, slide sets W-1, W-12, W-13, W-14, W-15, W-16, W-17 and W-18 (CC)
b. Georgia, slide sets REW-08a,b and c (RHAC)
c. Georgia, slide set RW-30-1, 2,3 and 4 (IE)
d. Prentice-Hall Media, VD 933

Student Manuals:

a. Georgia, Units SE-1 through SE-9 (CC)
b. Georgia, Unit REW-08 (RHAC)
c. Georgia, Unit RW-30 (IE)

Tools and Equipment:

a. Basic electrician's tools
b. Conductor
c. Conduit
d. Weatherhead
e. Bushings
f. Meter base
g. C.B.

CLASSROOM HOURS

3

EVALUATION (EL-35)

Given appropriate tools, supplies and equipment, the student will install an electrical service entrance for single-phase power according to NEC standards.

TASK

EL-36 Installing a circuit breaker box (or fuse box)

PERFORMANCE OBJECTIVE

Install a circuit breaker box or fuse box.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of circuit breaker boxes
b. Locating the box
c. Installing the box
d. Pulling conductors
e. Types of breakers
f. Installing breakers
g. Types of fuses
h. Installing a fuse box
i. Installing wiring and fuse or breaker for an electric furnace
j. Wiring thermostats

Provide Practical Application On:

Mount a circuit breaker, box and install breakers.

INSTRUCTIONAL MATERIALS

Textbooks:

a. Mullin
b. AAVIM, Maintaining the Wiring and Lighting System
c. AAVIM, Electrical Wiring
d. NEC Handbook

A/Vs:

a. Georgia, slide sets W-8,W-9, W-31 and W-32 (CC)
b. Georgia, slide sets RW-29-1,2,and 3 (IE)
c. Georgia slide sets REW-09a, b,c and d (RHAC)

Student Manuals:

a. Georgia, Units SES-1 and 2 (CC)
b. Georgia, Unit RW-29 (IE)
c. Georgia, Unit REW-09 (RHAC)
d. Georgia, Units EH-2 and EH-3 (CC)

Tools and Equipment:

a. Distribution panel on fusebox
b. Breakers or fuses
c. Screwdrivers
d. Wire strippers
e. Voltohmmeter
f. Tape measure

CLASSROOM HOURS

3

EVALUATION (EL-36)

Given appropriate tools, supplies and equipment, the student will locate and install a circuit breaker for 115 volt and 230 volt applications. The installation must be in accordance with NEC standards.

TASK

EL-37 Wiring a switch box

PERFORMANCE OBJECTIVE

Wire a service switch box.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of conductors
b. Sizes of conductors
c. NEC regulations for conductor size and type
d. Selection of appropriate size breaker
e. Terminal connections
f. Safety

Provide Practical Application On:

Wire a service switch box and install the appropriate size breaker.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, Electrical Wiring
b. Mullin
c. NEC Handbook

A/Vs:

Georgia, slide set W-10 (CC)

Student Manuals:

Georgia, Unit SES-3 (CC)

Tools and Equipment:

a. Switch box
b. Breakers
c. Screwdrivers
d. Wire strippers
e. Voltohmmeter

CLASSROOM HOURS

3

EVALUATION (EL-37)

Given appropriate tools, supplies and equipment, the student will wire a service switch box according to NEC standards.

TASK

EL-38 Installing ground fault interruptors

PERFORMANCE OBJECTIVE

Install a ground fault interruptor.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Types of ground fault interruptors
b. Uses of the ground fault interruptor
c. How the ground fault interruptor works
d. Installing the ground fault
e. Effects of current and safety

Provide Practical Application On:

Install a ground fault interruptor.

INSTRUCTIONAL MATERIALS

Textbooks:

a. AAVIM, *Maintaining the Lighting and Wiring System*
b. AAVIM, *Electrical Wiring*

A/Vs:

Georgia, slide set W-7 (CC)

Student Manuals:

a. Georgia, Unit TE-7 (CC)
b. Georgia, Unit RW-11-A (IE)

Tools and Equipment:

a. Distribution panel
b. Ground fault interruptor
c. Wire stripper
d. Screwdriver
e. Pliers
f. Voltohmmeter

CLASSROOM HOURS

2

EVALUATION (EL-38)

Given appropriate tools, supplies and equipment, the student will correctly install a ground fault interruptor according to the instructor's satisfaction.

TASK

EL-39 Installing a temporary service entrance

PERFORMANCE OBJECTIVE

Install a temporary service entrance.

INSTRUCTIONAL ACTIVITIES

Provide Information On:

a. Identifying and installing power outlet box
b. Identifying and installing power cutoff
c. Determining meter base size and installing meter base
d. Estimating mast size
e. Installing mast conduit
f. Assembling and installing weatherhead
g. Safety

Provide Practical Application On:

Install power outlet box, cutoff, meter base, mast, weatherhead and wire a temporary service entrance.

INSTRUCTIONAL MATERIALS

a. Mullin
b. AAVIM, Electrical Wiring
c. AAVIM, Maintaining the Lighting and Wiring System
d. NEC Handbook

A/Vs:

a. Georgia, slide sets W-1 through W-7 (CC)
b. Georgia, slide set REW-10a (RHAC)

Student Manuals:

a. Georgia, Units TE-1 through TE-7 (CC)
b. Georgia, Unit REW-10 (RHAC)

Tools and Equipment:

a. Power outlet box
b. Power cutoff
c. Meter base
d. Weatherhead
e. Mast
f. Wire
g. Wire strippers

(continued on next page)

CLASSROOM HOURS 2

EVALUATION (EL-39)

Given appropriate tools, supplies and equipment, the student will install and wire a temporary service entrance according to NEC standards.

INSTRUCTIONAL MATERIALS (continued)

Tools and Equipment:

h. Pliers
i. Voltohmmeter
j. Screwdrivers

SECTION VI

REFERENCES, RESOURCES

RESOURCES

Instructional Resource Matrix

The Instructional Resource Matrix lists the instructional resources required to carry out the learning activities in each unit in the program. The resources are divided into the categories of audio visuals, textbooks and student materials.

Audio visuals are identified by the following symbols: filmstrips (FS), slides (S), slide/tapes (ST), tapes (T), videotapes (VT), transparencies (TR) and film loops (FL).

Textbooks are identified by the author(s)/publisher and title.

Student Materials (instructional units) are identified by publisher and title.

Textbook List

This list identifies the textbooks referenced in the Unit Guides section and on the Instructional Resource Matrix.

Instructional Units

The publishers of the instructional units referenced on the Unit Guides and the Instructional Resource Matrix are listed.

Audio Visuals

The suppliers of the audio visuals referenced on the Unit Guides and the Instructional Resource Matrix are listed.

Additional Instructional Resources

This section lists instructional resources which may be used in addition to those primary resources listed on the Unit

Guides. The resources are divided into three categories.

Textbooks: A list of textbooks in addition to those referenced on the Unit Guides is provided.

Audio Visuals: Suppliers of audio visuals in addition to those referenced on the Unit Guides are listed. Also identified are the types of audio visuals available.

Individualized Instruction: This section identifies suppliers of individualized instruction materials in addition to those referenced on the Unit Guides.

RESOURCE ADDRESSES

Addresses of instructional materials referenced on the Unit Guides and in the Additional Instructional Resources section are given.

CURRICULUM AREA: CONSTRUCTION (Masonry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
M-01 Spreading mortor	Georgia: BSB-1 (ST)	Dezettel; Kreh; Putnam	Georgia: Unit BSB-1
M-02 Laying brick to a line	Georgia: BSB-2 (ST)	Cook and Trent; Dezettel	Georgia: Unit BSB-2; Kreh: Unit 15
M-03 Building a brick corner	Georgia: BSB-3 (ST)	Dezettel; Putnam	Georgia: Unit BSB-3; Kreh: Unit 16
M-04 Cutting brick and block	Georgia: BSB-4 (ST)	Dezettel; Kreh; Putnam	Georgia: Unit BSB-4
M-05 Determining spacing for standard size brick	Georgia: BSR-1 (ST)	Putnam	Georgia: Unit BSR-1
M-06 Laying courses to sill and cornice height		Dezettel; Putnam	Georgia: Unit BSR-2
M-07 Interpreting and using a line modular rule	Georgia: BSR-3 (ST)	Dezettel; Kreh	Georgia: Unit BSR-3
M-08 Dimensioning and scaling a working drawing		B.I.A.	
M-09 Identifying names and uses of lines and symbols on a working drawing		B.I.A.	
M-10 Identifying different views and their uses on a working drawing		B.I.A.	
M-11 Setting batter boards	B.I.A.: "Laying Out a Foundation" (ST)	Dalzell and Townsend	B.I.A.: Project 34
M-12 Inspecting grading at building site		B.I.A.; Dalzell and Townsend	

CURRICULUM AREA: CONSTRUCTION (Masonry)

TASK LISTING		INSTRUCTIONAL MATERIAL REFERENCES		
		Audio-Visuals	Textbooks	Student Materials
M-13	Finishing grading at building site		B.I.A.; Dalzell and Townsend	
M-14	Setting frames for footing and foundations		Dalzell and Townsend	
M-15	Installing steel reinforcing		Dalzell and Townsend	
M-16	Operating a transit		B.I.A.	
M-17	Pouring footing		Dalzell and Townsend	
M-18	Laying an 8" wall with header	Georgia: DBW-1 (ST)	Dezettel; Putnam	Georgia: Unit DBW-1
M-19	Building an L shaped 8" wall with header coursed, header caps and rollocks	Georgia: DBW-1 (ST)	Dezettel	Georgia: Units DBW-2, DBW-3 and DBW-4; Kreh: Unit 22
M-20	Constructing cavity walls		B.I.A.; Dalzell and Townsend	B.I.A., Project 7
M-21	Laying a 4" block corner in running bond	Georgia: CD-1, CBC-1 and CBC-2 (ST)	Dezettel; Kreh; Putnam	Georgia: Unit CBC-2
M-22	Laying an 8" block corner in running bond	Georgia: CD-1, CBC-1 and CBC-2 (ST)	Dezettel; Kreh; Putnam	Georgia: Unit CBC-1
M-23	Building a 6" block corner in running bond	Georgia: CD-1, CBC-1 and CBC-2 (ST)	Dezettel; Kreh; Putnam	Georgia: Unit CBC-3

CURRICULUM AREA: CONSTRUCTION (Masonry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
M-24 Building a 12" block corner in running 1/2 bond	Georgia: CD-1, CBC-1 and CBC-2 (ST)	Dezettel; Kreh; Putnam	Georgia: Unit CBC-4
M-25 Laying a block corner in stacked bond	Georgia: CD-1, CBC-1 and CBC-2 (ST)	Dezettel; Kreh; Putnam	Georgia: Unit CBC-5
M-26 Building an English corner	Georgia: LBB-1 (ST)	Kreh	Georgia: Unit LBB-1
M-27 Building a Dutch corner	Georgia: LBB-1 (ST); B.I.A.: "Brick Bonds" (ST)	Dezettel; Kreh	Georgia: Unit LBB-2
M-28 Laying a Flemish bond	Georgia: LBB-1 (ST); B.I.A.: "Brick Bonds" (ST)	Dezettel	Georgia: Unit LBB-3
M-29 Laying an English bond	Georgia: LBB-1 (ST); B.I.A.: "Brick Bonds" (ST)	Dezettel	Georgia: Unit LBB-4
M-30 Making and testing concrete	Georgia: CM-1 (ST)	Dezettel; Putnam; Cook and Trent	Georgia: Unit CM-1
M-31 Finishing concrete	Georgia: CM-1 (ST)	Dezettel; Putnam	Georgia: Unit CM-2
M-32 Estimating concrete		Dezettel; Putnam; Wagner	Georgia: Units CM-3 and CM-3b
M-33 Mixing and finishing terrazzo	Georgia: TS-1 (ST)		Georgia: Units TS-1, TS-2 and TS-3
M-34 Estimating masonry materials			Georgia: Units ME-1a, ME-1b, ME-1c, ME-2a, ME-2b, ME-2c and ME-3
M-35 Setting corner poles	B.I.A.: "Corner Poles" (ST)	B.I.A.	B.I.A.: Project 32

CURRICULUM AREA: CONSTRUCTION (Masonry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
M-36 Laying reinforced brick masonry		B.I.A.	
M-37 Making reinforced lintels		Dalzell and Townsend	
M-38 Setting lintels		B.I.A.; Dalzell and Townsend	
M-39 Setting door frames		B.I.A.; Dalzell and Townsend	
M-40 Using anchors to tie doors to walls		B.I.A.; Dalzell and Townsend	
M-41 Setting window frames		Dalzell and Townsend	
M-42 Laying soldier course		B.I.A.	
M-43 Laying rowlock sills		Ray	
M-44 Placing expansion joints		Ray	
M-45 Building brick steps		B.I.A.	
M-46 Constructing glazed tile walls		B.I.A.	
M-47 Laying structural clay tile		B.I.A.	
M-48 Waterproofing walls		B.I.A.; Dalzell and Townsend	
M-49 Setting stone		B.I.A.	
M-50 Cleaning brickwork		B.I.A.	

CURRICULUM AREA: CONSTRUCTION (Masonry)

TASK LISTING		INSTRUCTIONAL MATERIAL REFERENCES		
		Audio-Visuals	Textbooks	Student Materials
M-51	Building a rough fireplace and ash pit	B.I.A.: "Fireplace Construction" (ST)	Dalzell and Townsend; Ray	
M-52	Setting clean-out door		Dalzell and Townsend	
M-53	Forming firebox	B.I.A.: "Fireplace Construction" (ST)	Dalzell and Townsend; Ray; B.I.A.	
M-54	Setting ash dump		Dalzell and Townsend	
M-55	Assembling and setting damper	B.I.A.: "Fireplace Construction" (ST)	Dalzell and Townsend; Ray; B.I.A.	
M-56	Forming wind shelf		Dalzell and Townsend; Ray	
M-57	Building smoke chamber	B.I.A.: "Fireplace Construction" (ST)	Dalzell and Townsend	
M-58	Setting and cutting flue liners	B.I.A.: "Fireplace Construction" (ST)	Dalzell and Townsend; Ray	
M-59	Topping and capping chimney		Dalzell and Townsend; Ray; B.I.A.	
M-60	Flashing chimney		Dalzell and Townsend	
M-61	Facing fireplace		Dalzell and Townsend; Ray; B.I.A.	

CURRICULUM AREA: CONSTRUCTION (Masonry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
M-62 Building a hearth	B.I.A.: "Fireplace Constuction" (ST)	Dalzell and Townsend; Ray; B.I.A.	
M-63 Building single flue chimney		Ray; B.I.A.	B.I.A.: Project 15
M-64 Building bar-b-que pit		B.I.A.	
M-65 Install a heatilator		B.I.A.	
M-66 Building diamond pattern		B.I.A.	
M-67 Laying a basket weave pattern		B.I.A.	B.I.A.: Projects 26 and 27
M-68 Building a herringbone weave bond		B.I.A.	B.I.A.: Projects 28 and 29
M-69 Cutting and laying mitre blocks		B.I.A.	B.I.A.: Project 30
M-70 Building a jack arch		B.I.A.	B.I.A.: Project 19
M-71 Building a segmented arch		B.I.A.	B.I.A.: Project 17
M-72 Building a soldier arch		B.I.A.	B.I.A.: Project 20
M-73 Laying glass blocks		B.I.A.	
M-74 Laying walks and floors		B.I.A.; Dalzell and Townsend	B.I.A.: Projects 25 and 26
M-75 Building planters		B.I.A.	
M-76 Building garden walls	B.I.A.: "Brick in Landscape Design" (ST)	B.I.A.	

CURRICULUM AREA: CONSTRUCTION (Carpentry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
C-01 Reading a rule		Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Units ML-1a; ML-2
C-02 Reading a scale	Dorsett (ST)	Wagner; Feirer and Hutchings; Sundberg	Georgia: Unit BR-1
C-03 Reading orthographic drawings	Dorsett (ST); Prentice-Hall: "Foundations" (ST)	Wagner; Feirer and Hutchings; Sundberg	Georgia: Unit BR-2
C-04 Identifying elevations	Dorsett (ST); Prentice-Hall: "Foundations" (ST)	Wagner; Feirer and Hutchings; Sundberg	Georgia: Unit BR-3
C-05 Identifying symbols	Dorsett (ST)	Wagner; Feirer and Hutchings; Sundberg	Georgia: Unit BR-4; BR-5; BR-6
C-06 Identifying structural details from a cross section of a house	Dorsett (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Sundberg	Georgia: Unit BR-7
C-07 Determining information from plot plans	Dorsett (ST)	Douglas and Werner; Feirer and Hutchings; Wagner; Sundberg	Georgia: Unit BR-9
C-08 Building a sawhorse			Georgia: Units BSH-1; BSH-2; BSH-3; BSH-4

CURRICULUM AREA: CONSTRUCTION (Carpentry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
C-09 Installing sills and floor joists	Dorsett (ST); Prentice-Hall: "Floor and Wall Framing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit SMH-1
C-10 Installing floor decking	Dorsett (ST); Prentice-Hall: "Floor and Wall Framing" (ST); DCA: "Foundation and Floor Framing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit SMH-2
C-11 Laying out, sawing and assembling exterior frame wall	Dorsett (ST); Prentice-Hall: "Floor and Wall Framing (ST); DCA: "Building Construction Exterior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit SMH-4
C-12 Laying out, sawing and framing windows and doors	Dorsett (ST); Prentice-Hall: "Completing the Exterior" (ST); DCA: "Building Construction Exterior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit SMH-3
C-13 Laying out, cutting and installing weatherboard	McGraw-Hill: "Siding Sense" (MF); 3-M Company: "Carpentry Exterior Trim" (TR); Prentice-Hall: "Completing the Exterior" (ST)	Capotosto; Wagner; Durbahn; Masonite	Georgia: Unit SMH-9
C-14 Laying out and framing a stairwell opening	Prentice-Hall: "Installing Floor Joists and Sub-Flooring" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	Georgia: Units STC-1; STC-2

CURRICULUM AREA: CONSTRUCTION (Carpentry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
C-15 Constructing stairs	Dorsett (ST); DCA: "Building Construction Exterior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Units STC-1; STC-2
C-16 Cutting and installing ceiling joist	Dorsett (ST); DCA: "Building Construction Exterior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit SMH-5
C-17 Identifying parts of a roof	Dorsett (ST); Prentice-Hall: "Roofing" (ST); DCA: "Building Construction Exterior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit SMH-6a; SMH-6b; SMH-6c; SMH-6d
C-18 Laying out, cutting and erecting common rafters as required to build a gable roof	Dorsett (ST); Prentice-Hall: "Roofing" (ST); DCA: "Building Construction Exterior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Sundberg	Georgia: Unit SMH-6e
C-19 Laying out, cutting and installing a gambrel roof	Audio Active (T); Dorsett (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	Georgia: Unit RD-1
C-20 Installing a hip roof	Audio Active (T); Dorsett (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	Georgia: Unit RD-3

CURRICULUM AREA: CONSTRUCTION (Carpentry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
C-21 Installing roof decking and applying felt underlayment	Audio Active (T); Dorsett (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit SMH-7
C-22 Laying out asphalt composition shingles	Audio Active (T); Dorsett (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Units SMH-8a; SMH-8b
C-23 Framing a roof opening for a chimney	Prentice-Hall: "Roofing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	
C-24 Building a porch cornice	Prentice-Hall: "Roofing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	
C-25 Building a projected box cornice for a brick veneer structure	Prentice-Hall: "Roofing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	
C-26 Building a closed box cornice	Prentice-Hall: "Roofing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	

CURRICULUM AREA: CONSTRUCTION (Carpentry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
C-27 Installing dormers	Prentice-Hall: "Roofing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	
C-28 Installing flashing	Prentice-Hall: "Roofing" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	
C-29 Installing drywall	Dorsett (ST); DCA: "Building Construction Interior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner	Georgia: Unit DI-1
C-30 Filling nail holes, taping and floating	Dorsett (ST); DCA: "Building Construction Interior" (ST)	Wagner; Feirer and Hutchings	Georgia: Units DI-2; DI-3
C-31 Hanging wallpaper		Wagner	Georgia: Unit DI-6
C-32 Painting drywall		Wagner	Georgia: Unit DI-5
C-33 Stippling drywall	Dorsett (ST)	Wagner; Douglas and Werner	Georgia: Unit DI-4
C-34 Installing crown molding	Dorsett (ST); Audio Active (T); DCA: "Building Construction Interior" (ST)	Douglas and Werner; Feirer and Hutchings; Wagner	Georgia: Unit IIT-3

CURRICULUM AREA: CONSTRUCTION (Carpentry)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
C-35 Installing interior plywood paneling	Dorsett (ST); DCA: "Building Construction Interior" (ST)	Wagner; Feirer and Hutchings; Rebaud	Georgia: Unit PAN-1
C-36 Installing a pre-hung door	Audio Active (T); Dorsett (ST)	Wagner; Feirer and Hutchings	Georgia: Unit WD-1
C-37 Installing a door lock set		Wagner; Feirer and Hutchings	Georgia: Unit WD-2
C-38 Installing a pre-hung window	Audio Active (T); Dorsett (ST); Prentice-Hall: "Completing the Exterior" (ST)	Wagner; Feirer and Hutchings	Georgia: Unit WD-3
C-39 Trimming out a window	Dorsett (ST); DCA: "Building Construction Interior" (ST)	Wagner; Rebaud	Georgia: Unit IIT-1
C-40 Installing base molding	Dorsett (ST); DCA: "Building Construction Interior" (ST)	Douglas and Werner; Feirer and Hutchings; Wagner	Georgia: Unit IIT-2
C-41 Installing sliding and folding interior doors	Prentice-Hall: "Completing the Interior" (ST)	Douglas and Werner; Feirer and Hutchings; Rebaud; Wagner; Durbahn	
C-42 Installing insulation materials	Prentice-Hall: "Completing the Interior" (ST)	Douglas and Werner: Feirer and Hutchings; Rebaud; Wagner; Durbahn	

CURRICULUM AREA: CONSTRUCTION (Plumbing)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
P-01 Identifying the nature of the work of plumbers		Ripka	Georgia: Unit ITP-1
P-02 Selecting pipe and fittings		Oravetz; Ripka	Georgia: Unit BPP-1-1
P-03 Measuring pipe		Day; Ripka	Georgia: Unit BPP-2
P-04 Cutting and reaming metal pipe		Ripka	Georgia: Unit BPP-3
P-05 Threading pipe		Day; Ripka; Slater	Georgia: Unit BPP-4
P-06 Identifying copper pipe fittings		Day; Slater; and Smith; Ripka	Georgia: Unit BPP-5
P-07 Laying out, cutting, reaming, flaring and flanging copper tubing		Slater and Smith	Georgia: Unit BPP-6
P-08 Soldering copper tubing	Georgia: BPP-7 (ST)	Slater and Smith; Ripka	Georgia: Unit BPP-7
P-09 Joining copper tubing to brass pipe	Audio Active: tape 1, side 1; tape 3, side 1 (T)	Day; Oravetz; Slater	Georgia: Units BPP-5, BPP-6; Plumbing II: Unit 2
P-10 Joining copper tubing to copper pipe	Georgia: Unit BPP-7 (ST)	Day; Slater and Smith; Oravetz; Matthias and Smith	Georgia: Unit BPP-7; Plumbing II: Unit 2
P-11 Joining copper tubing to steel pipe	Audio Active: Tape 3, side 1 (T)	Matthias and Smith; Slater; Oravetz	

CURRICULUM AREA: CONSTRUCTION (Plumbing)

TASK LISTING		INSTRUCTIONAL MATERIAL REFERENCES		
		Audio-Visuals	Textbooks	Student Materials
P-12	Bending copper tubing with a spring bender	Audio Active: tape 1, side 1; tape 3, side 1 (T)	Slater; Oravetz	*Plumbing I*: Unit 8; *Basic Plumbing*: Unit 7
P-13	Bending steel pipe		Arco; Oravetz; Matthias and Smith; Frankland	Arco: *Plumbing and Heating Guide*; *Plumbing I*: Unit 41
P-14	Cutting cast iron soil pipe		Oravetz; Slater and Smith; Ripka	Georgia: Unit BPP-8
P-15	Caulking a lead joint on cast iron soil pipe		Oravetz; Ripka	Georgia: Unit BPP-9
P-16	Identifying plastic pipe fittings		Day; Ripka	Georgia: Unit BPP-10
P-17	Cutting and joining plastic pipe		Ripka	Georgia: Unit BPP-11
P-18	Roughing-in fixtures		Oravetz; Ripka	Georgia: Units RI-1, RI-2
P-19	Selecting and installing fittings and pipe		Oravetz; Ripka	Georgia: Units RI-3, RI-4
P-20	Installing vent terminals (roof flashing)	Audio Active: Lesson 4; tape 2, side 2 (T)	Slater; Oravetz; D'Arcangelo and Guest	*Plumbing II*: Unit 11; *Mathematics for Plumbers and Pipefitters*: Unit 47
P-21	Installing cold and hot water supply		Oravetz; Ripka	Georgia: Units RI-3, RI-4
P-22	Installing clean-outs on waste lines	Audio Active: Lesson 4; tape 2, side 2 (T)	Slater; Matthias and Smith; Oravetz; Day	*Plumbing I*: Unit 39; *Basic Plumbing*: Unit 48

CURRICULUM AREA: CONSTRUCTION (Plumbing)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
P-23 Installing bathtubs and showers		Ripka; Slater and Smith	Georgia: Unit IF-1
P-24 Installing a water closet	Georgia: IF-2 (ST)	Ripka; Slater and Smith	Georgia: Unit IF-2
P-25 Installing a wall hung lavatory		Ripka; Slater and Smith	Georgia: Unit IF-3
P-26 Installing a kitchen sink		Ripka; Slater and Smith	Georgia: Unit IF-4
P-27 Installing electric water heaters	Audio Active: Lesson 16; tape 8, side 2 (T)	Slater; Day; Oravetz; Matthias and Smith	Plumbing II: Unit 41
P-28 Supporting horizontal and vertical pipes		Matthias and Smith; Slator; Oravetz	Plumbing I: Unit 24 Basic Plumbing: Units 28, 29
P-29 Installing cut off valves		Matthias and Smith; Slator; Oravetz	Plumbing II: Unit 17
P-30 Installing pressure relief valves		Slator; Matthias and Smith Walters and Ferrell; Oravetz; Plumbing Code	Plumbing II: Unit 40
P-31 Cleaning pressure regulating valves		Slater; Oravetz; Matthias and Smith; Walters and Ferrell	Plumbing II: Unit 19

CURRICULUM AREA: CONSTRUCTION (Plumbing)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
P-32 Installing water lines		Walters and Ferrell; Mathias and Smith	
P-33 Making water pressure tests on water supply systems		Walters and Ferrell; Mathias and Smith; Oravetz; Slater	Plumbing II: Unit 21
P-34 Roughing-in water supply lines for water heaters	Audio Active: Lesson 9; tape 10, side 1 (T)	Slater; Day; Oravetz	Plumbing I: Unit 55
P-35 Clearing obstructions from lavatory drains	Audio Active: Lesson 5; tape 3, side 1 (T)	Slater; Day; Oravetz	Plumbing I: Unit 42; Basic Plumbing: Unit 51
P-36 Removing obstructions from a main drain line	Audio Active: Lesson 5; tape 3, side 1 (T)	Slater; Day; Oravetz	Plumbing I: Unit 43; Basic Plumbing: Unit 52
P-37 Removing obstructions from water closet drains	Audio Active: Lesson 5; tape 2, side 1 (T)	Slater	
P-38 Replacing lavatory trap drains	Audio Active: Lesson 10; tape 5, side 2 (T)	Slater; Day; Oravetz	Plumbing I: Unit 50; Basic Plumbing: Unit 57
P-39 Repairing leaking shower valves	Audio Active: Lesson 18; tape 9, side 2 (T)	Slater; Day; Oravetz	Plumbing I: Unit 51; Basic Plumbing: Unit 53
P-40 Repairing leaking faucets and valves	Audio Active: Lesson 5; tape 3, side 1 (T)	Slater; Day; Oravetz	Plumbing I: Unit 51; Basic Plumbing: Unit 53
P-41 Repairing water flush valves on water closets		Slater; Day; Walters and Ferrell; Oravetz	Plumbing I: Unit 29

CURRICULUM AREA: CONSTRUCTION (Plumbing)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
P-42 Replacing a section of water supply line	Audio Active: Lesson 3; tape 2, side 1, (T); Audio Active: Lesson 5; tape 3, side 1, (T); Georgia: BPP-3 (ST)	Slater; Day; Oravetz; Matthias and Smith	Plumbing I: Units 5, 6 and 12; Basic Plumbing: Units 8, 17; Georgia: Units BPP-3, BPP-4

CURRICULUM AREA: CONSTRUCTION (Residential Wiring)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
EL-01 Identifying basic electrical theory	Georgia: RW-1a; EL-01a; (ST); Prentice-Hall: VD1240 (ST)	AAVIM: Electrical Wiring; Understanding Electricity and Electrical terms; Alerich	Georgia: Units RW-1a; BET 1-10; EL-01a
EL-02 Installing a single 114 volt duplex outlet	Georgia: W-22; REW-01a; EL-03b; (ST); Prentice-Hall: VOT 736; 737 and 738 (ST)	AAVIM: Electrical Wiring; Mix	Georgia: Units VO-1; REW-01
EL-03 Wiring multiple convenience outlets	Georgia: RW-02a; REW-02b; REW-02c (ST)	AAVIM: Electrical Wiring; Mix	Georgia: Units VO-2; REW-02
EL-04 Wiring a switch controlled convenience outlet	Georgia: REW-03a; RW-1-1; RW-1-2; RW-1-3; RW-1-4; RW-1-5; RW-1-6; RW-1-7 (ST)	AAVIM: Electrical Wiring; Mix; Alerich	Georgia: Units VO-3; REW-03a; RW-1
EL-05 Installing three-wire branch circuits	Georgia: RW-12-1; RW-12-2; RW-14-1; RW-15-2; RW-15-3; RW-22-B-1 (ST); 22, side 1 (T)	NEC; AAVIM: Electrical Wiring	Georgia: Units RW-13; RW-14; RW-15; NEC-6; NEC-48
EL-06 Identifying code requirements for a small appliance circuit	Georgia: RW-12-1; RW-12-2 (ST)	NEC; AAVIM: Electrical Wiring	Georgia: Unit RW-12
EL-07 Installing split switched receptacles	Georgia: REW-04a; REW-04b (ST)	Smith; Alerich; AAVIM: Electrical Wiring	Georgia: Unit REW-04

CURRICULUM AREA: CONSTRUCTION (Residential Wiring)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
EL-08 Installing a circuit with four receptacles and one single pole switch	Georgia: RW-7-1; RW-7-2; RW-7-3 (ST); "NEC"-3, side 2; "NEC"-4, side 1 (T)	NEC	Georgia: Units RW-7; RW-8; NEC-5; NEC-6
EL-09 Installing five receptacles on a split circuit	Georgia: RW-9-1 (ST)	AAVIM: Electrical Wiring	Georgia: Unit RW-9
EL-10 Wiring one light with a single pole switch and one outlet	Georgia: W-25 (ST)	Mix; AAVIM: Electrical Wiring	Georgia: Unit 06-1
EL-11 Wiring a lighting circuit with a single pole switch	Georgia: W-24 (ST)	Mullin; AAVIM: Maintaining the Lighting and Wiring System	Georgia: Unit 06-1
EL-12 Wiring two lights with a single pole switch	Georgia: W-25; REW-03a; REW-03b; RW-2-1; RW-3-1; RW-4a-1; (ST); Prentice-Hall: 739, 740, 741 (ST)	Mix; AAVIM: Electrical Wiring	Georgia: Unit OL-2; REW-03a; RW-2; RW-2a; RW-3; RW-4a
EL-13 Wiring two three-way switches	Georgia: W-26; REW-06a; RW-4-1; RW-4-2 (ST)	Mullin; AAVIM: Maintaining the Lighting and Wiring System; Electrical Wiring	Georgia: Units OL-3; REW-06; RW-4
EL-14 Wiring two-three way switches with two lights	Georgia: W-27 (ST)	AAVIM: Electrical Wiring; Mullin	Georgia: Units OL-4

CURRICULUM AREA: CONSTRUCTION (Residential Wiring)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
EL-15 Wiring a four-way switch controlling one light	Georgia: RW-5-1; RW-6-1 (ST)	Mullin; AAVIM: Maintaining the Wiring and Lighting System; Electrical Wiring	Georgia: Units OL-5; RW-5; RW-6
EL-16 Wiring a master switch	Georgia: W-29 (ST)	Mix; AAVIM: Electrical Wiring	Georgia: Unit OL-6
EL-17 Wiring light fixtures	Georgia: W-37 (ST)	AAVIM: Electrical Wiring; Alerich	Georgia: Unit LF-1
EL-18 Hanging light fixtures	Georgia: W-38 (ST)	AAVIM: Electrical Wiring	Georgia: Unit LF-2
EL-19 Identifying electrical symbols	Georgia: REW-12a; RW-16a (ST)	AAVIM: Electrical Wiring; Alerich; Mullin	Georgia: Units REW-11; REW-12; RW-16a
EL-20 Installing electrical symbols into a floor plan and estimating materials	Georgia: RW-32-1; RW-32-2 (ST)	AAVIM: Electrical Wiring; Alerich; Mullin	Georgia: Units WD-1; RW-32
EL-21 Identifying principles and applications of transformers		Alerich; Mullin	Georgia: Units RW-27a; RW-27a-1
EL-22 Wiring a low voltage transformer	Georgia: W-39 (ST)	AAVIM: Electrical Wiring; Mullin	Georgia: Units LV-1

CURRICULUM AREA: CONSTRUCTION (Residential Wiring)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
EL-23 Installing a push button switch	Georgia: W-40 (ST)	AAVIM: Electrical Wiring; Mullin; Mix	Georgia: Unit LV-2
EL-24 Installing bells and chimes	Georgia: W-41; REW-05a; REW-23-1 (ST)	AAVIM: Electrical Wiring Mullin; Mix	Georgia: Units LV-3; REW-05; RW-23
EL-25 Wiring special low voltage circuits	Georgia: RW-24-1; RW-25-1; RW-26-1; RW-26-2; RW-26-3; RW-26-4; RW-26-5; RW-26-6; RW-26-7; RW-26-8; RW-29-a; RW-29-b; RW-29-c; RW-29-d; RW-29-e (ST)	Alerich	Georgia: Units RW-24; RW-25; RW-26
EL-26 Connecting 220 volt grounded outlets	Georgia: W-19; REW-07a (ST)	AAVIM: Electrical Wiring Mullin	Georgia: Units GC-1; REW-07
EL-27 Wiring a hot water heater	Georgia: W-20; RW-14-1; RW-22-1; RW-22-2; RW-22-3 (ST)	AAVIM: Electrical Wiring; Mullin; NEC	Georgia: Units GC-2; RW-14; RW-22
EL-28 Wiring ranges	Georgia: W-21; RW-16-1; RW-16-2; RW-17-1; RW-17-2; MA-01a (ST)	AAVIM: Electrical Wiring; Mullin	Georgia: Units GC-3; RW-16; RW-17
EL-29 Wiring baseboard type wall heaters	Georgia: W-30; W-18-1; W-18-2; W-18-3; W-18-4; W-18-5 (ST)	Mullin	Georgia: Units EH-1; RW-18

CURRICULUM AREA: CONSTRUCTION (Residential Wiring)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
EL-30 Installing a 230 volt central heating or cooling circuit and disconnect	Georgia: RW-19-1; RW-20-1 (ST)	AAVIM: *Electrical Wiring*; *NEC*	Georgia: Units GC-3; RW-16; RW-17
EL-31 Calculating loads	Georgia: RW-14-1; RW-28-1; RW-31-1; RW-31-2 (ST)	AAVIM: *Electrical Wiring*; *NEC*	Georgia: Units RW-13a; RW-13a-1; RW-28; RW-31
EL-32 Calculating wire size and voltage drop	Georgia: RW-13b-1; RW-13b-2 (ST)	AAVIM: *Electrical Wiring*; Alerich; *NEC*	Georgia: Units RW-13b; RW-20a
EL-33 Making calculations for three-wire branch circuits		AAVIM: *Electrical Wiring*; Mullin; *NEC*	Georgia: Units RW-10a; NEC-4
EL-34 Selecting conduit for service entrance	Georgia: REW-08b; W-4; W-33; W-34; W-35; W-36 (ST)	AAVIM: *Electrical Wiring*; Mullin	Georgia: Units TE-4; C-1; C-4
EL-35 Installing an electrical service entrance for single phase power	Georgia: W-11; W-12; W-13; W-14; W-15; W-16; W-17; W-18; REW-08a; REW-08b; REW-08c; RW-30-1; RW-30-2; RW-30-3; RW-30-4; (ST); Prentice-Hall: VD933 (ST)	AAVIM: *Electrical Wiring*; Alerich; Mix; Mullin	Georgia: Units SE-1; SE-2; SE-3; SE-4; SE-5; SE-6; SE-7; SE-8; SE-9; REW-08; RW-30
EL-36 Installing a circuit breaker box (or a fuse box)	Georgia: W-8; W-9; RW-29-1; RW-29-2; RW-29-3; REW-09a; REW-09b; REW-09c; REW-09d; W-31; W-32; (ST)	AAVIM: *Electrical Wiring*; *Maintaining the Wiring and Lighting System*; *NEC*; Mullin	Georgia: Units SES-1; SES-2; RW-9; REW-09; EH-2; EH-3

CURRICULUM AREA: CONSTRUCTION (Residential Wiring)

TASK LISTING	INSTRUCTIONAL MATERIAL REFERENCES		
	Audio-Visuals	Textbooks	Student Materials
EL-37 Wiring a switch box	Georgia: W-10 (ST)	AAVIM: Electrical Wiring; Mullin; NEC	Georgia: Unit SES-3
EL-38 Installing ground fault interruptors	Georgia: W-7 (ST)	AAVIM: Electrical Wiring; Maintaining the Electrical Wiring System	Georgia: Units TE-7; RW-11-a
EL-39 Installing a temporary service entrance	Georgia: W-1; W-2; W-3; W-4; W-5; W-6; W-7; REW-10a (ST)	AAVIM: Electrical Wiring; Maintaining the Lighting and Wiring System; NEC; Mullin	Georgia: Units TE-1; TE-2; TE-3; TE-4; TE-5; TE-6; TE-7; REW-10

TEXTBOOK LIST

A Catalog of Performance Objectives, Criterion-Referenced Measures and Performance Guides in Masonry. Vocational Technical Consortium of States (V-TECS).

Alerich, W.N., *Electrical Construction Wiring*. Chicago, IL: American Tech, 1971.

Capotosto, J., *Basic Carpentry* (2nd ed.). Tarrytown, NY: Prentice-Hall, 1980.

Colvin, T.S., *Electrical Wiring*. Athens, GA: AAVIM, 1979.

Cook, G. and Trent, R., *An Analysis of the Masonry Occupation.* Columbus, OH: Instructional Materials Laboratory, Ohio State University, 1976.

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Dalzell, R. and Townsend, G., *Masonry Simplified: Tools, Materials, Practices* (3rd. ed.). Chicago: American Tech.

Day, R., *The Practical Handbook of Plumbing and Heating*. New York: Arco Publishing Co., 1969.

Dezettel, L.M., *Masons and Builders Library* (Volumes 1 and 2, 2nd ed.). Indianapolis: Audel, 1972. (Available from Bobbs-Merrill).

Durbahn, W.E. and Putnam, R.E., *Fundamentals of Carpentry I: Tools, Materials and Practices*. Chicago, IL: American Tech.

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Frankland, T.W., *Pipefitters and Pipe Welders Handbook*. Bruce Publishing Co., 1969.

Henderson, C.E.,et al., *Maintaining the Lighting and Wiring System*. Athens,GA: AAVIM, 1974.

Kicklighter, C.E., *Modern Masonry.* South Holland, IL: Goodheart-Willcox, 1980.

Kreh, R.T., *Advanced Masonry Skills*. Albany, NY: Delmar Publishers, 1978.

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Matthias and Smith, How to Design and Install Plumbing. Chicago: American Tech, 1967.

Mix, F.M., House Wiring Simplified. South Holland, IL: Goodheart-Willcox, 1973.

Mullin, R.C., Electrical Wiring - Residential. Albany, NY: Delmar Publishers, 1978 and 1981.

National Electrical Code 1978. Boston, MA: National Fire Protection Association, 1978.

Oravetz, J., Plumbers and Pipefitters Library. Indianapolis, IN: Audel, 1967.

Plan Reading for Brickmasons. McLean, VA: Brick Institute of America, 1968.

Putnam, R.E., Bricklaying Skills and Practice. Chicago: American Tech, 1974.

Putnam, R.E., Concrete Block Construction. Chicago: American Tech, 1973.

Ray, J.E., The Art of Bricklaying. Peoria, IL: Charles A. Bennett Co., 1976.

Ripka, L.V., Plumbing: Installation and Design. Chicago, IL: American Tech.

Roark, W.F. and Plummer, H.C., Bricklaying Vocational Training: Instructor's Guide. McLean, VA: Brick Institute of America, 1973.

Roark, W.F. and Plummer, H.C., Bricklaying Vocational Training: Student Textbook. McLean, VA: Brick Institute of America, 1973.

Slater, H. and Smith, L., Advanced Plumbing (Instructor's Guide also available). Albany, NY: Delmar Publishers, 1980.

Slater, H. and Smith, L., Basic Plumbing (Instructor's Guide also available). Albany, NY: Delmar Publishers, 1979.

Slater, H. and Smith, L., Plumbing I. Albany, NY: Delmar Publishers.

Turner, J.H., Understanding Electricity and Electrical Terms. Athens, GA: AAVIM, 1974.

Wagner, W.H., Modern Carpentry. South Holland, IL: Goodheart-Willcox, 1979.

Walters and Ferrell, Steam and Hot Water Fittings. Chicago: American Tech, 1967.

AUDIO VISUALS

Georgia (VEMC)

Prentice-Hall Media

Dorsett

McGraw-Hill

B.I.A. (Brick Institute of America)

Audio Active

DCA

INSTRUCTIONAL UNITS

Instructional units listed in the Unit Guides and Instructional Resource Matrix may be obtained from these two sources.

1. Georgia - Produced for the Georgia Department of Education and available from:

   University of Georgia
   College of Education
   Division of Vocational Education
   Vocational Education Materials Center

2. B.I.A. - Produced by the Brick Institute of America and available from:

   Brick Institute of America
   Region Nine Office

ADDITIONAL INSTRUCTIONAL RESOURCES

Textbooks

Badzinski, S., *Stair Layout*. American Tech.

Ball, J.E., *Carpenters and Builders Library*. (Volumes I-IV, 4th ed.). Audel, 1976.

Ball, J., *Light Construction Techniques: Foundations to Finish*. Prentice-Hall, 1980.

Ball, J.E., *Interior and Exterior Trim*. Delmar, 1975

Blankenbaker, E.K., *Modern Plumbing*. Goodheart-Willcox.

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DeCristoforo, R.J., *Concrete and Masonry: Techniques and Design*. Tarrytown, NY: Prentice-Hall, 1975.

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Jones R.P., *Framing, Sheathing and Insulation*. Delmar, 1973.

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Oravetz, J. *Questions and Answers for Plumbers Examinations*. (2nd ed.). Audel, 1977.

Palmquist, R.E., *Guide to the 1978 National Electrical Code*. Audel, 1978.

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Recommended Practices for Laying Concrete Block. St. Paul: Hobar Publications, 1980.

Rocks G., *Residential Wiring*. American Tech.

Smith, R.C., Honkala, T.L. and Andres, C.K., *Masonry: Materials, Design and Construction*. Tarrytown, NY: Prentice-Hall, 1979.

Sullivan, J.A., *Plumbing: Installation and Design*. Prentice-Hall, 1980.

Traister, J.E., *Residential Electrical Design*. Howard W. Sams, 1975.

Ulrey, H.F., *Carpentry and Building*. Audel, 1966.

Van Orman, H.A., *Estimating for Residential Construction*. Delmar, 1978.

Watson, J., *Roofing Systems: Materials and Application*. Prentice-Hall, 1979.

Wass, A. and Sanders, G.A., *Materials and Procedures for Residential Construction*. Prentice-Hall, 1981.

Wilson, J.D. and Werner, S.O., *Simplified Stair Layout*. (2nd ed.). Delmar, 1973.

Audio Visuals

AAVIM	Slides and cassettes, transparencies
Automated Training, Inc.	Sound filmstrips, 16 mm snap-in cartridge
Bergwall Productions, Inc.	Sound filmstrips
Bobbs-Merrill	Slides/tapes
Career Aids, Inc.	Sound filmstrips
Classroom Film Distributors, Inc.	16 mm films
Colonial Films	16 mm films sound filmstrips
Cornell University	Motion pictures
Daystar Audio Visual	Sound filmstrips
DCA Educational Products	Sound filmstrips
Encyclopedia Britannica Education Corp.	Sound filmstrips
Eye Gate House, Inc.	Sound filmstrips
Hobar Publications	Transparencies
Instructional Materials Laboratory, University of Missouri	Slides/tapes
Minnesota Mining and Manufacturing Co.	Transparencies
National Film Board of Canada	Sound filmstrips
Prentice-Hall Media	Sound filmstrips, slides and cassettes
Robert Brady Co.	Sound filmstrips
Society for Visual Education, Inc.	Sound filmstrips
Sterling Educational Films	16 mm films

Universal Education and Visual Arts	Motion cartridges
University of Illinois	Sound filmstrips
University of Illinois, Vocational/Agriculture Service	Sound filmstrips
U.S. Department of Agriculture	Sound filmstrips
Vocational Education Media Center, Clemson University	Transparencies

Individualized Instruction

Instructional Materials Laboratory, University of Missouri-Columbus	Study guides
Oklahoma State Department of Vocational and Technical Education	Instructional units
Mid-American Vocational Curriculum Consortium	Instructional units

Curriculum

Ahl, C., Masonry: Teacher's Guide. New Brunswick, NJ: Vocational-Technical Curriculum Laboratory, Rutgers, 1973.

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RESOURCE ADDRESSES

American Tech
5608 Stony Island Avenue
Chicago, IL 60637

Audio Active, Inc.
Jonesboro, AR 72401

Automated Training, Inc.
Box 34707
Charlotte, NC 28234

Bergwall Productions, Inc.
839 Stewart Avenue
Garden City, NY 11530

Bobbs-Merrill Educational
Publishing
4300 West 62nd Street
P.O. Box 7080
Indianapolis, IN 46206

Brick Institute of America
Region Nine Office
100 Northcreek-Suite 280
Atlanta, GA 30327

California State Department
of Education
Bureau of Industrial Education
721 Capitol Mall
Sacramento, CA 95814

Career Aids, Inc.
8950 Lurline Avenue, Dept. T7
Chatsworth, CA 91311

Charles A. Bennett Co., Inc.
809 West Detweiller Drive
Peoria, IL 61615

Classroom Film Distributors,
Inc.
5610 Hollywood Boulevard
Los Angeles, CA 90028

Colonial Films
752 Spring Street, N.W.
Atlanta, GA 30308

Daystar Audio Visual
3 Inverness Drive East
Englewood, CO 80112

DCA Educational Products, Inc.
Subsidiary of Display Corporation of America
424 Valley Road
Warrington, PA 18976

Delmar Publishers
50 Wolf Road
Albany, NY 12205

Department of Industrial Education
University of Maryland
College Park, MD 20742

Dorsett Educational Systems,
Inc.
P.O. Box 1226
Norman, OK 73070

Encyclopedia Britannica Educational Corporation
425 N. Michigan Avenue
Chicago, IL 60611

Eye Gate House, Inc.
146-01 Archer Avenue
Jamaica, NY 11435

Garden Way Publishing
Charlotte, VT 05445

Goodheart-Willcox Co., Inc.
123 W. Taft Drive
South Holland, IL 60473

Headquarters
Department of the Army
Washington, D.C.

Hobar Publications
1234 Tiller Lane
St. Paul, MN 55112

Instructional Materials
Laboratory
10 Industrial Education
Building
University of Missouri-Columbia
Columbia, MO 65211

Instructional Materials Laboratory
Trade and Industrial Education
Ohio State University
Columbus, OH 43210

McKnight Publishing Co.
Box 2854
Bloomington, IL 61701

Mid-America Vocational Curriculum Consortium
1515 West Sixth Avenue
Stillwater, OK 74074

Minnesota Mining and Manufacturing Co.
Medical Film Laboratory
3M Center
St. Paul, MN 55101

National Film Board of Canada
1251 Avenue of the Americas
New York, NY 10020

National Fire Protection Association
470 Atlantic Avenue
Boston, MA 02210

Nebraska Department of Education
Division of Vocational Education
2333 S. Tenth Street
Lincoln, NE 68508

New York State Education Department
Bureau of Secondary Curriculum Development
Albany, NY 12224

Oklahoma State Department of Vocational and Technical Education
1515 W. Sixth Street
Stillwater, OK 74074

Prentice-Hall Media
Serv Code XF
150 White Plains Road
Tarrytown, NY 10591

RMI Film Productions
701 Westport Road
Kansas City, MO 64111

Robert Brady Co.
150 White Plains Road
Tarrytown, NY 10591

Sanford Research Project
Sanford, NC 27330

Society for Visual Education, Inc.
Division of Singer Co.
1345 Diversey Parkway
Chicago, IL 60614

Sterling Educational Films
241 East 34th Street
New York, NY 10016

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Universal Education and Visual Arts
100 Universal City Plaza
Universal City, CA 91608

University of Georgia
College of Education
Division of Vocational Education
Vocational Education Materials Center
Green Street
Athens, GA 30602

University of Illinois
Visual Aids Service
1325 S. Oak
Champaign, IL 61820

University of Illinois
Vocational Agriculture Service
434 Mumford Hall
Urbana, IL 61801

University of Texas
Division of Extension
Instructional Materials
Service
Austin, TX

U.S. Department of Labor
Bureau of Apprenticeship
and Training
Washington, DC 20210

U.S. National Audio
Visual Center
Genral Services
Administration
Washington, DC 20409

U.S. Department of
Agriculture
Motion Picture Service
Room 1850, South Bldg.
Washington, DC 20250

Vocational Education Media
Center
Clemson University
Clemson, SC 29631

Vocational-Technical
Curriculum Laboratory
Rutgers University
Building 4103
Kilmer Campus
New Brunswick, NJ 08903

Wisconsin Vocational Studies
Center
University of Wisconsin-
Madison
964 Education Sciences Bldg.
1025 West Johnson Street
Madison, WI 53706

SECTION VII

STUDENT RECORDS

STUDENT RECORDS

This section contains three forms, the Individual Progress Report Chart, the Group Progress Chart and the Student Competency Record. The use of these charts is described below.

INDIVIDUAL PROGRESS REPORT. One copy should be kept in each student's confidential file and updated as tasks are completed. Grades should be assigned upon task completion and then averaged for grade reporting. Difficulty, excessive amounts of time, etc. should be noted on this form and should be discussed with the student and/or parents.

GROUP PROGRESS CHART. This chart reflects task completion only and can be displayed in the classroom or lab area. Due to confidentiality of records, a grade must not be recorded. The instructor should maintain a copy of this record and update it daily.

STUDENT COMPETENCY RECORD. This record provides a listing of all tasks or units in the program, a space designated for the student's name, D.O.T. numbers and job title and a check off column for date of task completion. The D.O.T. number and job title should be filled in when the student leaves the program for any reason. The information will indicate his/her qualifications for a job. This information will be especially useful to early leavers who have not completed the total program. The Task Listing/D.O.T. Code Cross Reference Table in Section III contains the information required to identify the particular job title for which the student is qualified.

The following is a list of tasks which will enable a student to meet the requirements for the identified occupation.

MASONRY

Cement Mason Helper (869.687-026)	Bricklayer Helper (861.687-010)	Stone Mason Helper (869.687-026)
01	01	01
20	02	04
21	04	07
25	07	27
27	25	29
28	27	46
29	29	
31	35	
35	38	
45	45	
	47	

Cement Mason (844.369-010)	Stone Mason (861.381-038)	Bricklayer Construction (863.381-018)
01	01	M-01 thru M-76
M-20 thru M-23	04	
M-25 thru M-31	07	
	26	
	27	
	29	
	35	
	46	

CARPENTRY

Roofer (860.381-010)	Carpenter Helper (860.664-014)	Rough Carpenter (860.381-042)
C-01	C-01	C-01 thru C-14
C-17 thru C-22	C-08 thru C-12	C-16 thru C-26
	C-16	C-29
	C-32	C-30
		C-32
		C-33
		C-36
		C-38

Carpenter II (860.681-010)
C-01 thru C-18
C-21 thru C-26
C-29 thru C-40

PLUMBING

Pipe Cutter
(862.682-010)

P-01 thru P-05
P-07
P-12 thru P-14
P-17
P-18
P-22
P-29
P-34

Pipe Fitter Helper
(862.684-022)

P-01 thru P-05
P-07
P-12
P-13
P-31
P-35 thru P-42

Plumbing Assembler Installer
(862.684-022)

P-01 thru P-17
P-20 thru P-33
P-35 thru P-42

Plumber
(862.381-030)

P-01 thru P-42

Pipe Fitter
(862.381-018)

P-01 thru P-14
P-16 thru P-21
P-23 thru P-27
P-29 thru P-31
P-33 thru P-42

RESIDENTIAL WIRING

Electrician Helper
(829.684-022)

EL-01 thru EL-05
EL-07 thru EL-18
EL-34
EL-36
EL-37
EL-39

Electrician
(824.261-010)

EL-01 thru EL-39

INDIVIDUAL PROGRESS REPORT

NAME ______________________________

PROGRAM/ ____________________________ AREA ____________________________
CLUSTER

TASK/ UNIT NO.	UNIT TITLE	DATE STARTED	DATE COMP.	EST. TIME	GRADE

GROUP PROGRESS CHART

NAME	UNITS/TASKS																				

RECORD OF DEMONSTRATED JOB COMPETENCIES

STUDENT NAME ______________________________ PROGRAM ________________________________

DICTIONARY OF OCCUPATIONAL TITLES JOB CLASSIFICATION: D.O.T. No. ____________________________________

JOB TITLE ____________________________________

Unit No.	Competency Demonstrated	Initial Date
	Measurement and Layout	
C-01	Reading a Rule	
	Blueprint Reading	
C-02	Reading a Scale	
C-03	Orthographic Drawings	
C-04	Elevation Drawings	
C-05	Symbols for Blueprints	
C-06	Structural Information	
C-07	Plot Plans	
	Selecting and Using Hand and Power Tools, Construction Materials and Fastening Devices	
C-08	Building a Sawhorse	
	Laying Out and Constructing a Floor System	
C-09	Installing Sills and Floor Joists	
C-10	Installing Floor Decking	
	Installing Walls and Frames	
C-11	Laying Out, Sawing and Assembling Exterior Wall Frame	
C-12	Laying Out, Sawing and Framing Doors and Windows	
C-13	Laying Out, Cutting and Installing Weatherboard	
C-14	Laying Out and Framing a Stairwell Opening	
C-15	Constructing Stairs	
	Installing Ceiling Systems	
C-16	Cutting and Installing Ceiling Joists	
	Building and Installing Roofing Systems	
C-17	Identifying Parts of a Roof	
C-18	Laying Out, Cutting and Erecting Common Rafters as Required to Build a Gable Roof	
C-19	Installing a Gambrel Roof	
C-20	Installing a Hip Roof	
C-21	Installing Roof Decking and Applying Felt Underlayment	
C-22	Laying Out Asphalt Composition Shingles	
C-23	Framing a Roof Opening for a Chimney	
C-24	Building a Porch Cornice	
C-25	Building a Projected Box Cornice (for Brick Veneer Construction)	

Unit No.	Competency Demonstrated	Initial Date
C-26	Building a Closed Box Cornice	
C-27	Installing Dormers	
C-28	Installing Flashing, Roof Caps and Vents	
	Installing Interior Trim	
C-29	Installing Drywall	
C-30	Filling Nail Holes, Taping and Floating	
C-31	Hanging Wallpaper	
C-32	Painting Drywall	
C-33	Stippling Drywall	
C-34	Installing Crown Molding	
C-35	Installing Interior Plywood Paneling	
C-36	Installing a Pre-Hung Door (Interior and Exterior)	
C-37	Installing a Door Lock Set	
C-38	Installing a Pre-Hung Window	
C-39	Trimming Out a Window	
C-40	Installing Base Molding	
C-41	Installing Sliding and Folding Interior Doors	
	Installing Insulation	
C-42	Installing Insulation Materials	
	Identifying Basic Electrical Theory Concepts	
EL-01	Identifying Basic Electrical Theory Concepts	
	Installing 115 Volt Outlets	
EL-02	Installing a Single 115 Volt Duplex Outlet	
EL-03	Wiring Multiple Convenience Outlets	
EL-04	Wiring a Switch Controlled Convenience Outlet	
EL-05	Installing Three-Wire Branch Circuits	
EL-06	Identifying Code Requirements for a Small Appliance Circuit	
EL-07	Installing Split Switched Receptacles	
EL-08	Installing a Circuit With Four Receptacles and One Single Pole Switch	
EL-09	Installing Five Receptacles on a Split Circuit	
	Installing Overhead Lights	
EL-10	Wiring a Light With a Single Pole Switch and One Outlet	

Unit No.	Competency Demonstrated	Initial Date
EL-11	Wiring a Lighting Circuit with a Single Pole Switch	
EL-12	Wiring Two Lights with a Single Pole Switch	
EL-13	Wiring Two Three-Way Switches	
EL-14	Wiring Two Three-Way Switches With Two Lights	
EL-15	Wiring a Four-Way Switch Controlling One Light	
EL-16	Wiring a Master Switch	
EL-17	Wiring Light Fixtures	
EL-18	Hanging Fixtures	
	Reading a Blueprint	
EL-19	Identifying Electrical Symbols	
EL-20	Installing Electrical Symbols into a Floor Plan and Estimating Materials	
	Making Low Voltage Applications	
EL-21	Identifying Principles and Applications of Transformers	
EL-22	Wiring a Low Voltage Transformer	
EL-23	Installing a Push Button Switch	
EL-24	Installing Bells and Chimes	
EL-25	Wiring Special Low Voltage Circuits	
	Making 220 Volt Connections	
EL-26	Connecting 220 Volt Grounded Outlets	
EL-27	Wiring a Hot Water Heater	
EL-28	Wiring Ranges	
EL-29	Wiring Baseboard Type Wall Heaters	
EL-30	Installing a 230 Volt Central Heating or Cooling Circuit and Disconnect	
	Calculating Loads	
EL-31	Calculating Loads	
EL-32	Calculating Wire Size and Voltage Drop	
EL-33	Making Calculations for Three-Wire Branch Circuits	
	Installing Service Entrance and Distribution Panel	
EL-34	Selecting Conduit for Service Entrance	
EL-35	Installing an Electrical Service Entrance for Single Phase Power	
EL-36	Installing a Circuit Breaker Box or Fuse Box	
EL-37	Wiring a Switch Box	
EL-38	Installing a Ground Fault Interruptor	
EL-39	Installing a Temporary Service Entrance	
	Performing Basic Bricklaying Manipulations	
M-01	Spreading Morter	
M-02	Laying Brick to a Line	
M-03	Building a Brick Corner	
M-04	Cutting Brick and Block	
	Using a Brick Spacing Rule	
M-05	Determining Spacing for Standard Sized Brick	
M-06	Laying Out Courses to Sill and Cornice Height	
M-07	Interpreting and Using a Line Modular Rule	
	Using Working Drawings	
M-08	Dimensioning and Scaling a Working Drawing	
M-09	Identifying Names and Uses of Lines and Symbols on a Working Drawing	
M-10	Identifying Different Views and Their Uses on a Working Drawing	
	Preparing Footings and Foundations	
M-11	Setting Batter Boards	
M-12	Inspecting Grading at Building Site	
M-13	Finishing Grading at Building Site	
M-14	Setting Frames for Footing/Foundations	
M-15	Installing Steel Reinforcing	
M-16	Operating a Transit	
M-17	Pouring Footing	
	Building Double Brick Walls	
M-18	Laying an Eight Inch Wall with Header	
M-19	Building an L-Shaped Eight Inch Wall with Header Courses, Header Caps and Rowlocks	
M-20	Constructing Cavity Walls	
	Building Block Corners	
M-21	Laying a Four Inch Block Corner in Running Board	
M-22	Laying an Eight Inch Block	
M-23	Building a Six Inch Block Corner in Running Board	
M-24	Building a Twelve Inch Block Corner in Running 1/2 Bond	
M-25	Laying a Block Corner in Stacked Bond	
	Laying Brick Bonds	
M-26	Building an English Corner	
M-27	Building a Dutch Corner	
M-28	Laying a Flemish Bond	
M-29	Laying an English Bond	
	Laying Concrete Slabs	
M-30	Making and Testing Concrete	
M-31	Finishing Concrete	

Unit No.	Competency Demonstrated	Initial Date
M-32	Estimating Concrete	
	Mixing and Finishing Terrazzo	
M-33	Mixing and Finishing Terrazzo	
	Estimating Masonry Materials	
M-34	Estimating Masonry Materials	
	Constructing Buildings	
M-35	Setting Corner Poles	
M-36	Laying Reinforced Brick Masonry	
M-37	Setting Lintels	
M-38	Making Reinforced Lintels	
M-39	Setting Door Frames	
M-40	Using Anchors to Tie Doors to Walls	
M-41	Setting Window Frames	
M-42	Laying Soldier Courses	
M-43	Laying Rowlock Sills	
M-44	Placing Expansion Joints	
M-45	Building Brick Steps	
M-46	Constructing Glazed Tile Walls	
M-47	Laying Structural Clay Tile	
M-48	Waterproofing Walls	
M-49	Setting Stone	
M-50	Cleaning Brickwork	
	Constructing Chimneys and Fireplaces	
M-51	Building Rough Fireplace and Ash Pit	
M-52	Setting Clean-Out Door	
M-53	Forming Firebox	
M-54	Setting Ash Dump	
M-55	Assembling and Setting Damper	
M-56	Forming Wind Shelf	
M-57	Building Smoke Chamber	
M-58	Setting and Cutting Flue Liners	
M-59	Topping and Capping Chimney	
M-60	Flashing Chimney	
M-61	Facing Fireplace	
M-62	Building Hearth	
M-63	Building Single Flue Chimney	
M-64	Building Bar-B-Que Pit	
M-65	Installing Heatilator	
	Laying Brick for Ornamental Purposes	
M-66	Building a Diamond Pattern Wall	
M-67	Laying a Basket Weave Bond	
M-68	Laying a Herringbone Weave Bond	
M-69	Cutting and Laying Mitre Blocks	
M-70	Building a Jack Arch	
M-71	Building a Segmental Arch	
M-72	Building a Soldier Arch	
M-73	Laying Glass Blocks	
M-74	Laying Walks and Floors	
M-75	Building Planters	
M-76	Building Garden Walls	
	Identifying Careers in the Plumbing Industry	
P-01	Identifying the Nature of the Work of Plumbers	
	Joining Pipe	
P-02	Selecting Pipe and Fittings	
P-03	Measuring Pipe	
P-04	Cutting and Reaming Metal Pipe	
P-05	Threading Pipe	
P-06	Identifying Copper Fittings	
P-07	Laying Out, Cutting, Reaming, Flaring and Flanging Copper Tubing	
P-08	Soldering Copper Tubing	
P-09	Joining Copper Tubing to Brass Pipe	
P-10	Joining Copper Tubing to Copper Pipe	
P-11	Joining Copper Tubing to Steel Pipe	
P-12	Bending Copper Tubing with a Spring Bender	
P-13	Bending Steel Pipe	
P-14	Cutting Cast Iron Soil Pipe	
P-15	Caulking a Lead Joint on Cast Iron Soil Pipe	
P-16	Identifying Plastic Pipe Fittings	
P-17	Cutting and Joining Plastic Pipe	
P-18	Roughing-in Fixtures	
P-19	Selecting and Installing Fittings and Pipe	
P-20	Installing Vent Terminals (Roof Flashing)	
	Installing Fixtures and Equipment	
P-21	Installing Cold and Hot Water Supply	
P-22	Installing Clean-Outs on Waste Lines	
P-23	Installing Bathtubs and Showers	
P-24	Installing a Water Closet	
P-25	Installing a Wall Hung Lavatory	
P-26	Installing a Kitchen Sink	
P-27	Installing Electric Water Heaters	
	Installing Hangers and Supports	
P-28	Supporting Horizontal and Vertical Pipes	
	Installing and Cleaning Cut Off Valves	
P-29	Installing Cut Off Valves	
P-30	Pressure Relief Valves	
P-31	Cleaning Pressure Regulating Valves	
	Insulating Water Lines	
P-32	Insulating Water Lines	
	Installing Water Supply Systems	
P-33	Making Water Pressure Tests on Water Supply Systems	
P-34	Roughing-in Water Supply Lines for Water Heaters	

Unit No.	Competency Demonstrated	Initial Date	Unit No.	Competency Demonstrated	Initial Date
P-35	Repairing Plumbing Fixtures Clearing Obstructions from Lavatory Drains		P-39	Repairing Leaking Shower Valves	
P-36	Removing Obstructions from Main Drain Lines		P-40	Repairing Leaking Water Faucets or Valves	
P-37	Removing Obstructions from Water Closet Drains		P-41	Repairing Water Flush Valves on Water Closets	
P-38	Replacing Lavatory Trap Drains		P-42	Replacing a Section of Water Supply Line	

This is to certify that the above named student has demonstrated proficiency in performing the tasks listed above, which have been determined to be the skills and knowledge that are necessary for entry level employment into the job classification indicated.

Date________________________ Instructor________________________

School________________________

SECTION VIII

SPECIAL NEEDS STUDENT

WORKING WITH SPECIAL NEEDS STUDENTS

Introduction

Special needs students are those who are designated as handicapped and/or disadvantaged. The 1976 vocational education amendment defines handicapped individuals as:

> Persons who are mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, orthopedically impaired, health impaired, or persons with other specific disabilities, who by reason thereof require special education and related services and who cannot succeed in the regular vocational education programs.

In Title II of the 1976 education amendments disadvantaged persons are defined as:

> Persons (other than handicapped persons) who have academic or economic disadvantages and who require special services, assistance or programs in order to enable them to succeed in vocational education programs.

Federal legislation requires that these special people be given an opportunity to function in a regular classroom. This section provides information on how special needs students are identified and how they can be mainstreamed into regular educational environments.

Figure One presents a model depicting various activities of the process in identifying and mainstreaming special needs students. These activities are conducted at three levels: the system level, the school level and the classroom level. All three levels must work together if implementation of the process is to be effective.

Identification Of The Special Needs Student

Through a variety of pre-testing procedures, special needs students are identified and their potentials are evaluated at the

SPECIAL NEEDS MAINSTREAMING MODEL

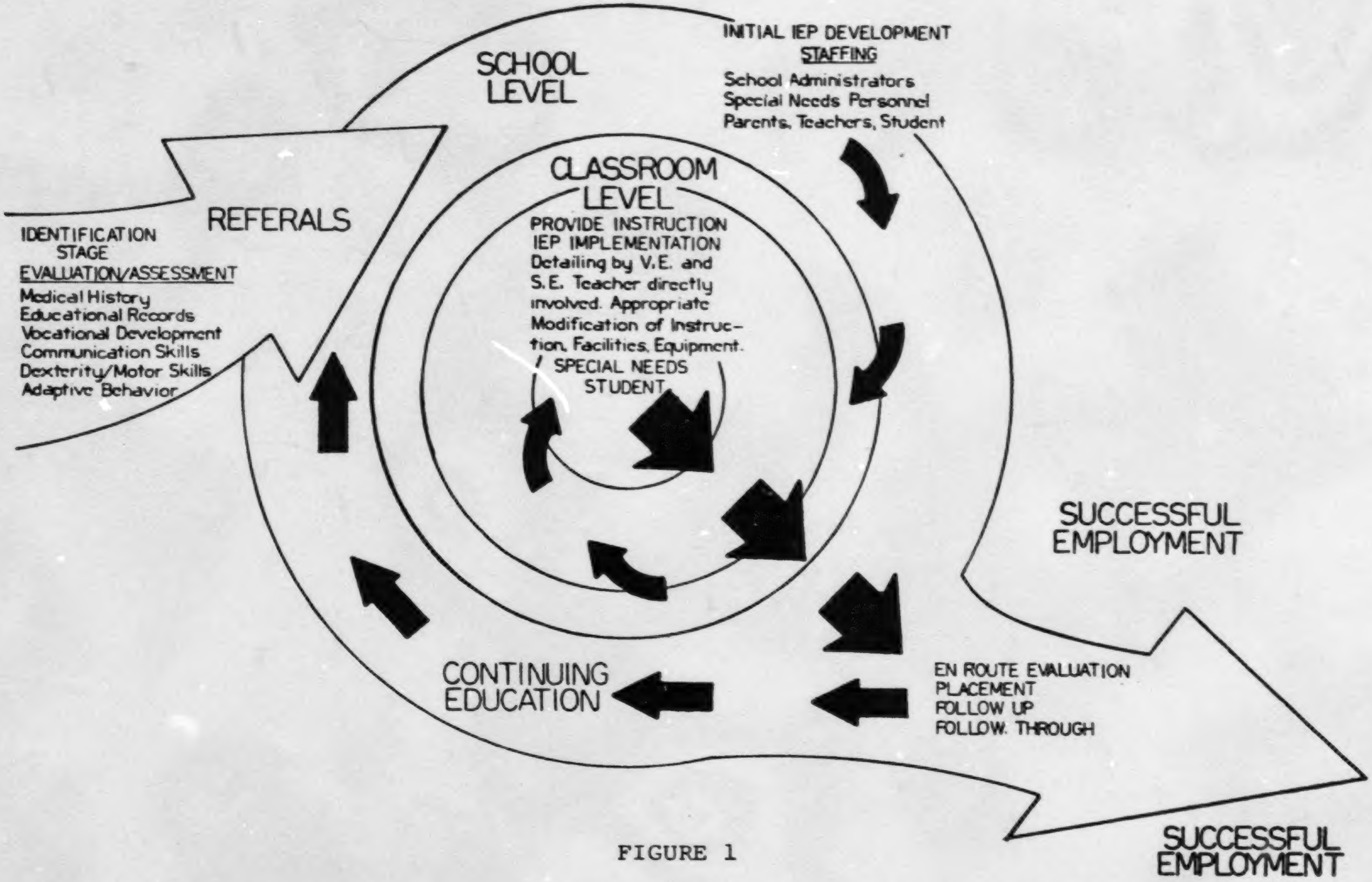

SCHOOL LEVEL
INITIAL IEP DEVELOPMENT
STAFFING
School Administrators
Special Needs Personnel
Parents, Teachers, Student
REFERALS
IDENTIFICATION STAGE
EVALUATION/ASSESSMENT
Medical History
Educational Records
Vocational Development
Communication Skills
Dexterity/Motor Skills
Adaptive Behavior
CLASSROOM LEVEL
PROVIDE INSTRUCTION
IEP IMPLEMENTATION
Detailing by V.E. and S.E. Teacher directly involved. Appropriate Modification of Instruction, Facilities, Equipment.
/ SPECIAL NEEDS STUDENT
SUCCESSFUL EMPLOYMENT
CONTINUING EDUCATION
EN ROUTE EVALUATION
PLACEMENT
FOLLOW UP
FOLLOW THROUGH
SUCCESSFUL EMPLOYMENT

FIGURE 1

system level. This evaluation process consists of collecting and assessing the following data for each student:

- -Medical History
- -Educational Records
- -Vocational Development
- -Communication Skills
- -Dexterity/Motor Skills
- -Adaptive Behavior

When this procedure has been completed, the system personnel refers the student to the appropriate school level personnel.

Development of the Plan

At the school level, an Individual Education Plan (IEP) is developed for each special needs student. An IEP is a written plan which describes the educational objectives, both long and short term, and the support services for a special needs student. The plan is developed by the school administration, special education personnel, teacher(s) directly involved with the student and the parent(s). In some cases, the student may help with the development.

Implementing the I.E.P.

The actual implementing of the I.E.P. begins at the classroom level. The purpose of the teacher dealing with the special needs student is to help the student set realistic goals, identify the barriers which make it difficult for the student to learn and adapt the curriculum and/or facilities with reference to the I.E.P. so the student can learn while overcoming personal barriers.

Special needs students have problems which hinder their learning. Therefore, a teacher's job becomes more complicated than when teaching "regular" students. Handicapped students may have a variety of problems - mental, physical and/or emotional.

Academically disadvantaged students may exhibit language deficiencies, reading and writing deficiencies, computational deficiencies and general educational deficiencies. Economically disadvantaged students may possess an inability to concentrate because their primary needs - food, shelter, clothing - are not adequately met due to lack of money.

By considering these problems, teachers can modify existing programs to accommodate the needs of special needs learners. Some suggestions which may prove beneficial in modifying an existing curriculum are listed below:

- Prepare instructional materials in greater detail and assign work in shorter units.
- Provide more frequent evaluation of student's progress and provide opportunities for remedial work.
- Be aware of the student's limited vocabulary.
- Be aware of the student's inability to understand abstractions and generalizations and prepare materials accordingly.
- Keep the student aware of his or her progress and make the student feel he or she can succeed.
- Use real teaching aids, live work and practical experiences whenever possible.
- Choose reading material which is at the student's level, interest and experience.
- Use constructive criticism only.
- Use peer instruction whenever possible.
- Allow the student to advance at his or her own pace.
- Use the part-to-whole learning concept in adapting materials.

Materials Which Can Be Used to Teach Disadvantaged

In Georgia an effective set of materials has been developed to be used with a program to help disadvantaged students adjust to life and work situations. This program is called CVAE or Coordinated Vocational Academic Education. The CVAE program is organized with a coordinator who is responsible for the type of instruction the students receive, and a team of teachers assigned to the coordinator who work cooperatively to help the disadvantaged students learn to enjoy school and become more successful students. CVAE materials include visuals in the form of synchronized slide/tape presentations. These units are designed to help the disadvantaged student become more successful in school, learn good work habits, become an aware consumer, and develop a better self-image and appearance. (Although designed especially for disadvantaged students, CVAE may also be used in regular classroom situations). The vocational education teacher should work with the CVAE coordinator to design a program of study for the disadvantaged students in areas in which the student needs help.

In some cases, facilities, must be modified for handicapped special needs students. In general, as long as the classroom/shop meets federal guidelines for barrier free design, extensive facility changes need not be made. For visually impaired students, for example, let the student locate in the classroom where he or she can see best even to the point of moving the desk or work station as a portable unit. In the case of orthopedically handicapped, some changes may have to be made to shop machinery to allow the student to use it. This may involve more convenient controls or special seating where the student would normally stand. In making these changes, special education expertise would be helpful.

Evaluation

Evaluation of the student's program should consist of:

-En-route evaluation (formative) to monitor the student's progress through the program.

-Summative evaluation upon completion of the program to determine job readiness.

-Follow-up after placement to determine if the student is successful on the job.

-Follow-through activities designed to identify any further training needed, which is indicated by the follow-up procedure.

Working with special needs students is much more demanding of the system, the school and the classroom teacher. However, with their patience and understanding, special needs students can not only succeed, but in many cases excell.

RESOURCES

To aid the teacher in modifying materials for special needs categories, the following references are listed by category. These are suggested references only as a world of materials exist on this subject.

Mentally Retarded

A Curriculum Guide for Teachers of Educable Mentally Retarded. Danville, Ill.: The Interstate Printers and Publishing Co., Inc.

High, Elizabeth C., and Moyers, Kathy L. Training Manual: Developing Pre-Vocational/Vocational Skills in Developmentally Disabled Persons. Washington, D.C.: Job Development Laboratory, George Washington University, 1976.

Kolstoe, Oliver P. Teaching Educable Mentally Retarded Children. Holt, Rinehart and Winston, 1976.

Mulligan, Robert E.; Gavin, Donald and Conaley, James. Comprehensive Career Education Curriculum Guide for the Trainable. New Brunswick, N.J.: Rutgers Vocational-Technical Curriculum Laboratory, 1977.

Introduction to Vocations for Educable Mentally Retarded. New Jersey: New Jersey Department of Education.

State of Ohio Curriculum Guide for Moderately Retarded Learners. Columbus, Ohio: Ohio Department of Education, 1977.

Tucker, Mark M. Learning through Curriculum Modification; A Blueprint to Teaching the Mentally Retarded. Johnstown, PA.: Mafex Associates, Inc., 1976.

Watson, Marjorie. Mainstreaming the Educable Mentally Retarded. Washington, D.C., NEA, 1975.

Hearing Impaired

Alvin, Howard P. The Evolution of an Evaluation Design for Evaluating Secondary Programs for the Deaf in Vocational Occupational-Technical Education (VOTE) Programs. ERIC - ED 123-241.

Guidelines: Educational Planning for the Hearing Handicapped. North Carolina Public Schools. Division for Exceptional Children, North Carolina Department of Public Instruction, Raleigh, N.C., 1977.

Munson, Harold L.; Eglston, Judy Cobb and Phillips, Gordon B. *Career Education for Deaf Students: An Inservice Leader's Guide*. University of Rochester, College of Education, Center for the Study of Helping Services, Rochester, N.Y. 1975.

Nix, Gary W. *Mainstreaming Education for Hearing Impaired Children and Youth*. Grune and Stratton, 1976.

Orthopedically and Other Health

A Model Plan for a Cooperative Vocational Rehabilitation Program. Office of Human Development, Rehabilitation Services and Administration. Department of Health, Education and Welfare, Washington, D.C.

Mallix, Kalisanker and Mueller, Jim. *Vocational Aids and Enhanced Productivity of the Severely Disabled*. The George Washington University Rehabilitation Research and Training Center, Washington, D.C. 1975.

McCarthy, Henry and Smart, Landon. *Recommendations for Enhancing Employment Prospects of Handicapped Individuals*. Comps. Human Resources Center, Albertson, L. I., 1978.

Duncan, John, et al. *Environmental Modifications for the Visually Impaired: A Handbook*. Visual Impairment and Blindness, December 1977, p. 442-455.

Disadvantaged

Guidelines for Methods and Techniques of Teaching Disadvantaged Students. Division of Vocational Education, Virginia Polytechnic Institute and State University, Blackburg, VA.

A Handbook for Developing Programs and Services for Disadvantaged Students. Department of Vocational Education Studies, College of Education, Southern Illinois, University of Carbondale, Carbondale, Ill. 62901

By Program

Adaption of Home Economics Curricula for Special Needs. North Dakota Research Coordination Unit, State Board for Vocational Education, State Office Building, Bismarck, ND.

Auto Body: An Adaptive and Developmental Program for Special Needs Students. Vocational-Technical Curriculum Laboratory, Rutgers - The State University, New Brunswick, N.J. 1976.

Floriculture Board of Cooperative Educational Services of Nassaw County, Division of Occupational Education, Division of Special Education, Westburg, NY 1975.

Grubb, Francine. Basic Business - A Teacher's Guide to an Employment Orientation Course for Special Needs Students. Vocational Technical Curriculum Laboratory, Rutgers - The State University, New Brunswick, N.J. 1976.

Home Economics and the Exceptional Student: A Handbook for Home Economics Teachers Working with Mentally Retarded Students. Vocational-Technical Curriculum Laboratory, Rutgers - The State University, New Brunswick, N.J. 1976.

Troutman, Carol M. Introduction to Office Occupations. Vocational-Technical Curriculum Laboratory, Rutgers - The State University, New Brunswick, N.J. 1974.

Working with the Handicapped in the Vocational Home Economics Classroom. Division of Vocational Education, State of Ohio, Columbus, Ohio.

Coordinated Vocational Education and Training (C.V.E.T.) manuals for disadvantaged, available from: Oklahoma State Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, 1515 West Sixth Avenue, Stillwater, Oklahoma 74074.

-CVET Construction	3100219	Teacher's Guide
	3100209	Student
-CVET General Mechanics	3100239	Teacher's Guide
	3100229	Student

General Special Needs

A Handbook for Modifying Vocational Curricula for Handicapped Students. Wisconsin Vocational Studies Center, University of Wisconsin, Madison, May 1980.

Bottoms, J.E. and Scott, C.P. Supportive services for special student groups. In J.E. Wall (ed.), Vocational Education for Special Groups. Sixth Yearbook, Washington, D.C.: American Vocational Association, 1976.

Gill, Douglas H. and Scott, C. Paul. A practical model for mainstreaming handicapped learners in vocational education. The Journal for Vocational Special Needs Education, Vol. 1, No. 3, April, 1979, pp. 3-7.

Gugerty, J., et al. Tools, Equipment and Machinery Adapted for the Vocational Educator and Employment of the Handicapped. Project #498749006, Wisconsin Vocational Studies Center, Madison, Wisconsin, January 1981.

Hull, Marc E., Berry, Owen J. and Clark, Donald L. Procedures for Teaching Vocational Concepts to Students with Special Needs. Texas A & M University, Final Report Project 62350274, June 1976.

The Related Vocational Instruction Program. Georgia's Approach to Vocational Education for the Handicapped at the Secondary level, Douglas H. Gill, Project Coordinator, Vocational Programs for the Handicapped, Georgia Southern College, Statesboro, Georgia.

Vocational Educational Resource Materials, A Bibliography of Materials for Handicapped and Special Education. Third edition, 1978. Wisconsin Vocational Studies Center, University of Wisconsin - Madison.

SECTION IX

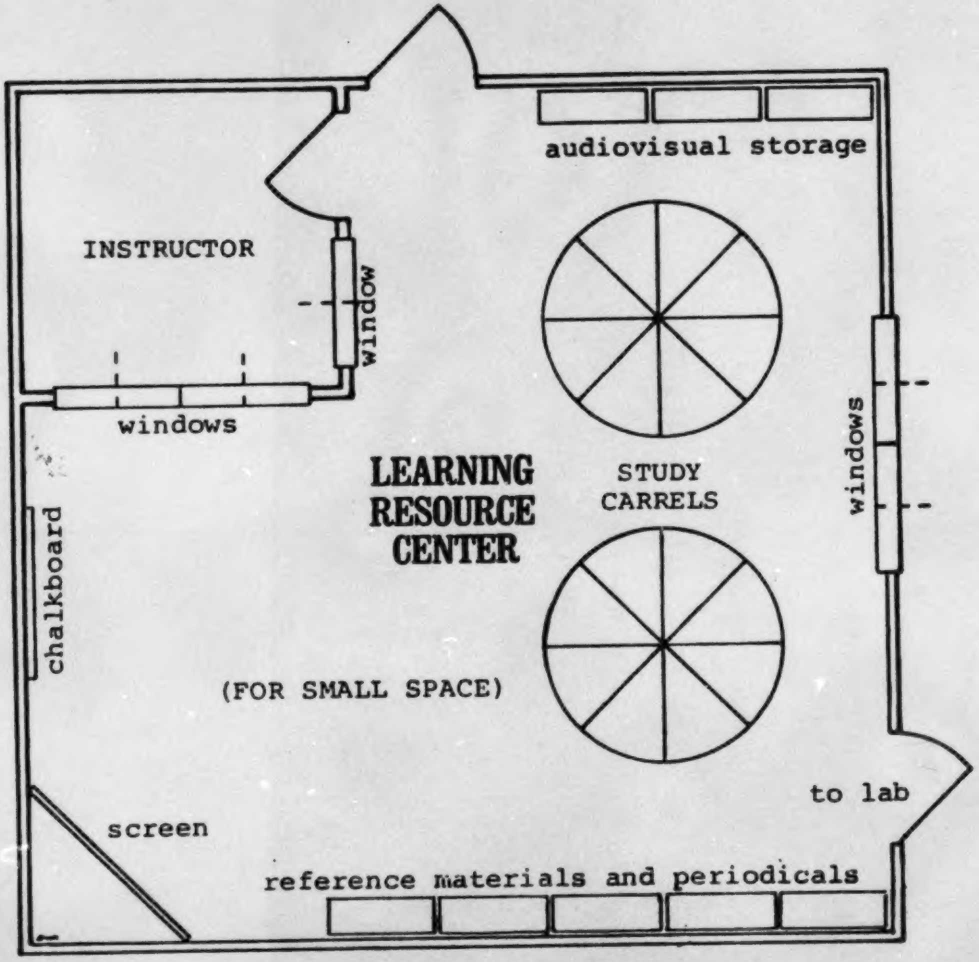
FACILITY LAYOUT

Facility Layout

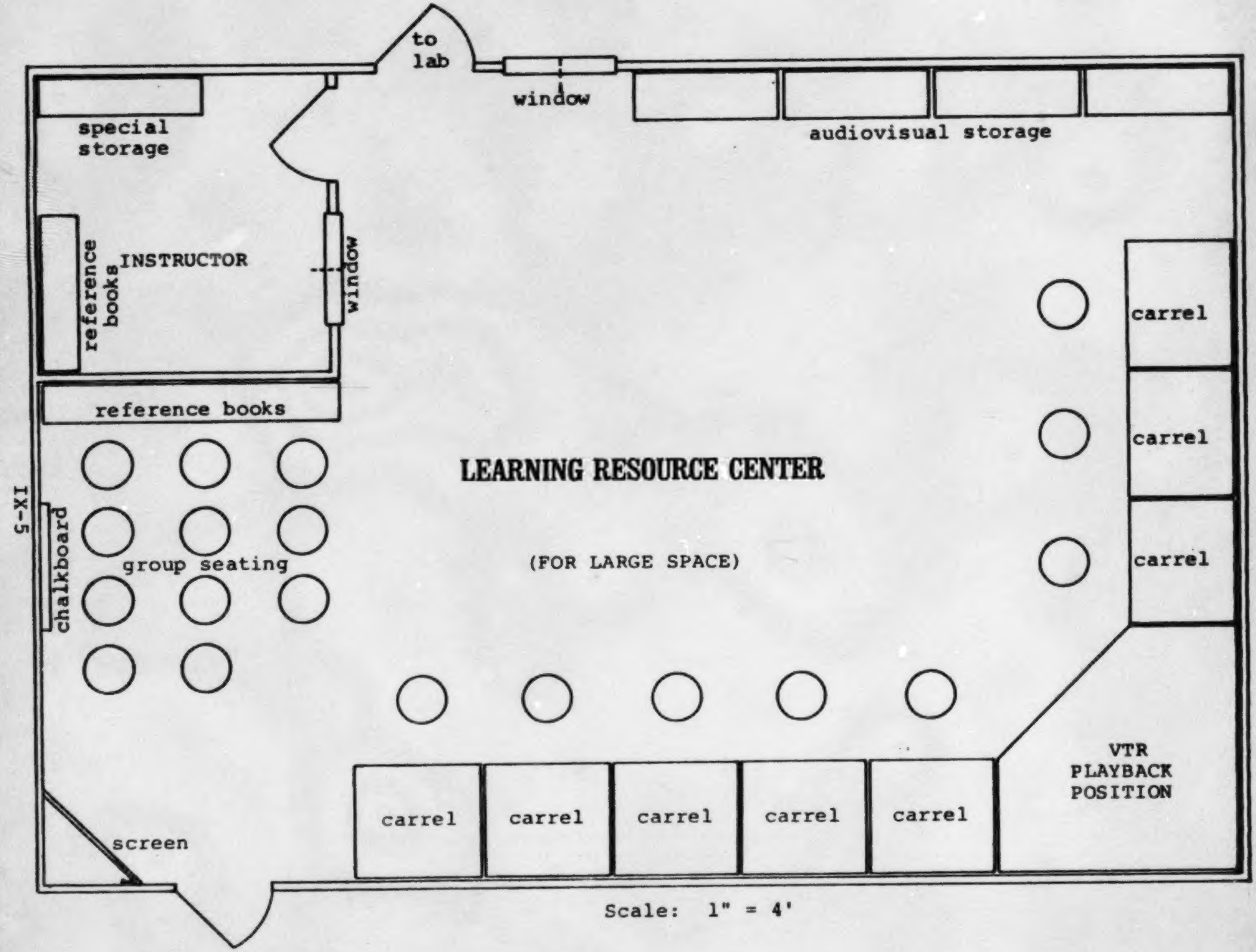
The facility layouts on the following pages are presented to aid in arranging the classroom and laboratory for efficient instruction. The three resource center arrangements represent small, medium and large centers. Ultimately the instructor must determine an arrangement that best fits the needs of the students and the instructional method being used.

The laboratory facility layout is one recommended by the teachers who helped develop the construction cluster program materials. This facility is easily adaptable to a variety of arrangements that will best fit local needs.

These layouts may be especially useful in those schools where classroom renovation or construction is being planned.


audiovisual storage
INSTRUCTOR
window
windows
LEARNING RESOURCE CENTER
STUDY CARRELS
windows
chalkboard
(FOR SMALL SPACE)
to lab
screen
reference materials and periodicals

Scale: 1" = 4'

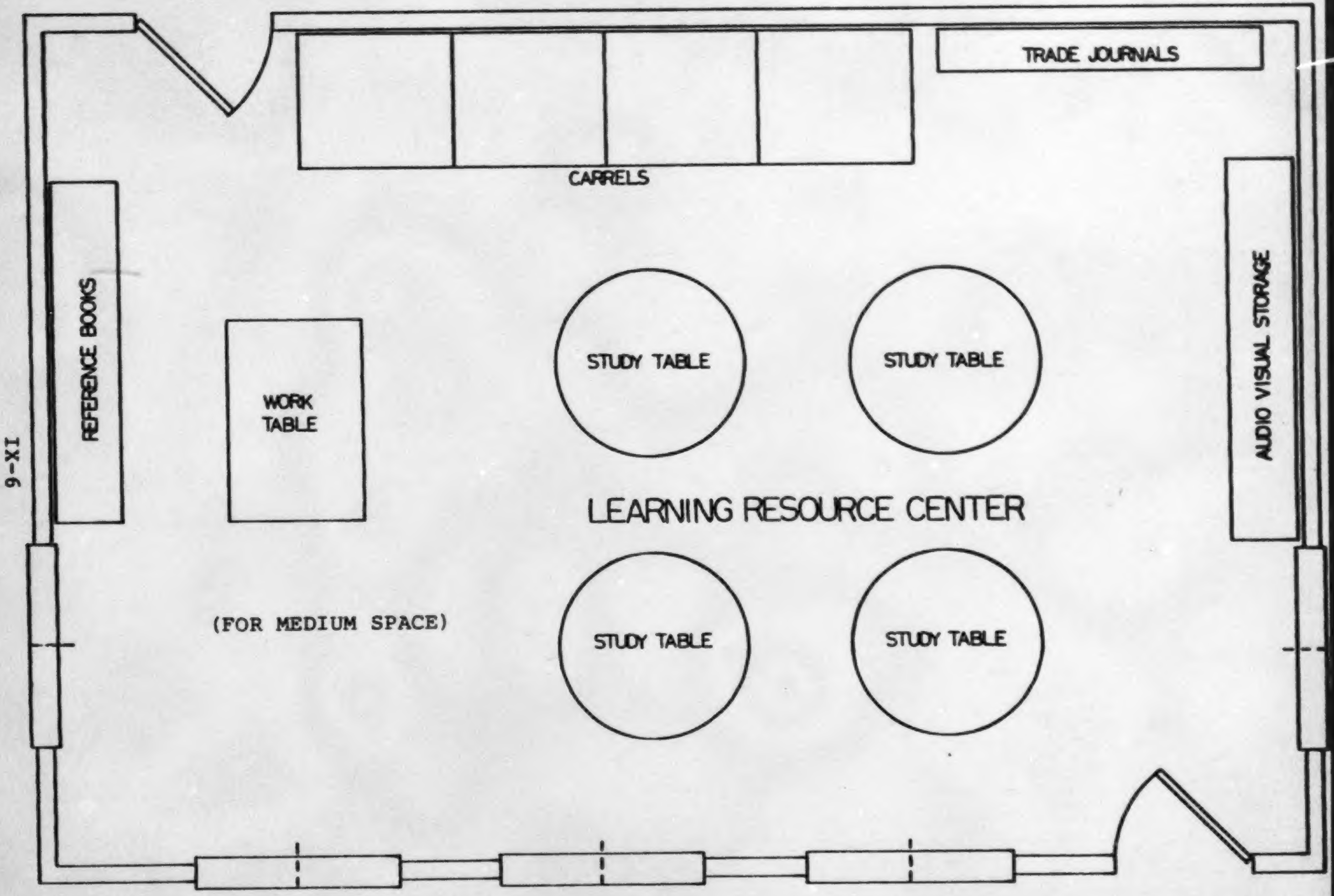


LEARNING RESOURCE CENTER

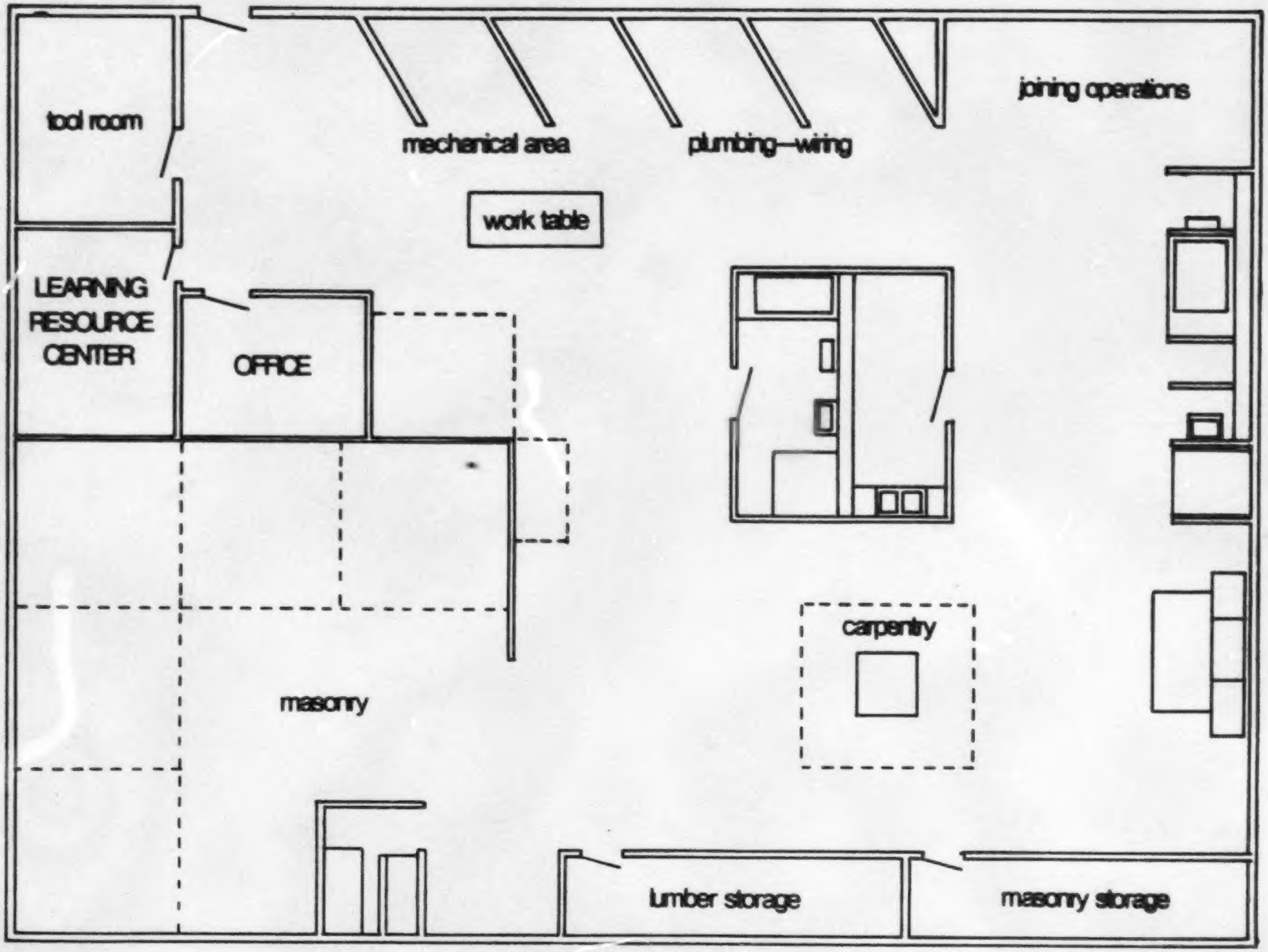
(FOR LARGE SPACE)

to lab
window
special storage
audiovisual storage
reference books
INSTRUCTOR
window
reference books
group seating
chalkboard
carrel
carrel
carrel
VTR PLAYBACK POSITION
screen
carrel
carrel
carrel
carrel
carrel

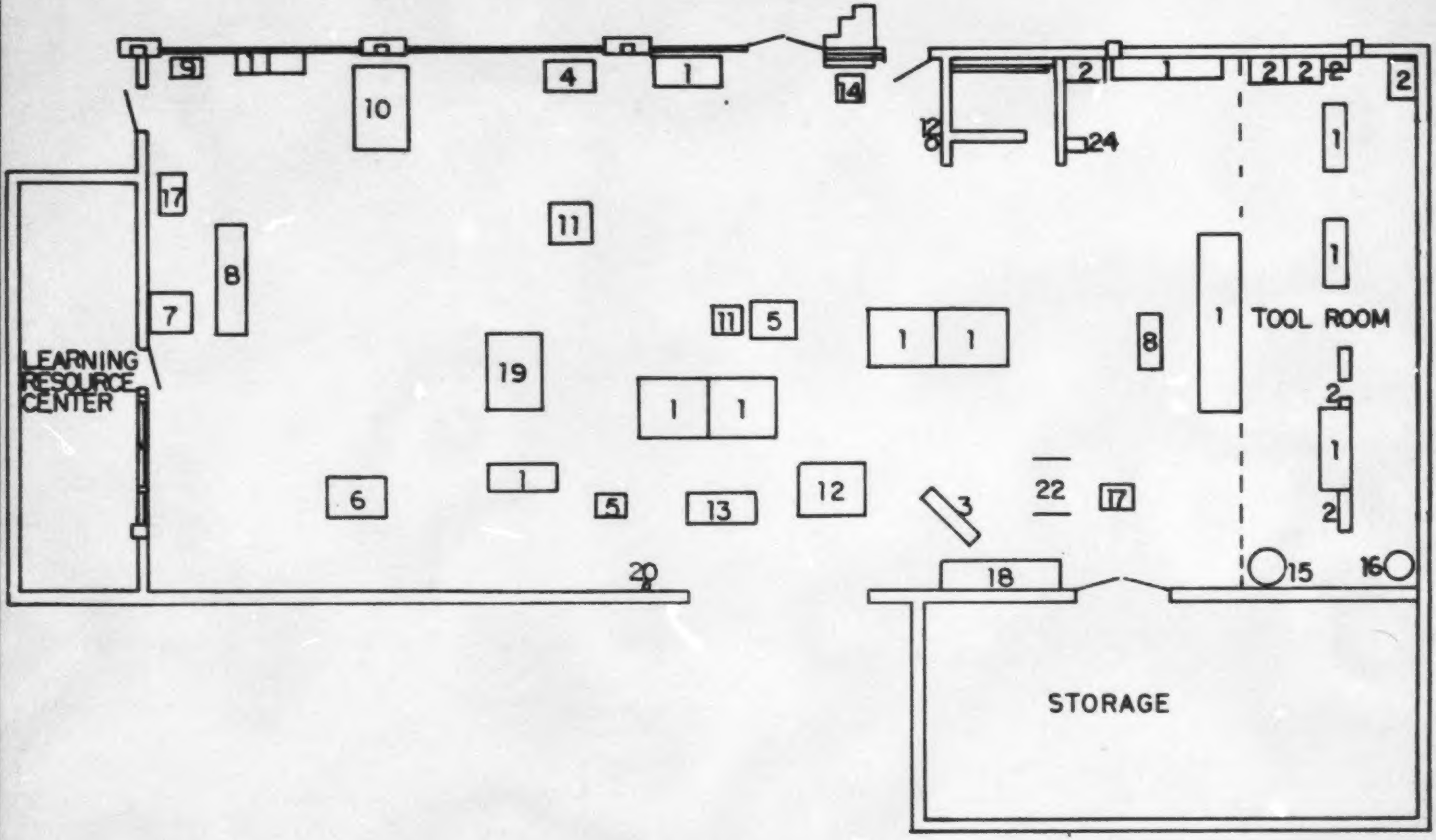
Scale: 1" = 4'


TRADE JOURNALS
CARRELS
REFERENCE BOOKS
WORK TABLE
STUDY TABLE
STUDY TABLE
AUDIO VISUAL STORAGE
LEARNING RESOURCE CENTER
(FOR MEDIUM SPACE)
STUDY TABLE
STUDY TABLE

CONSTRUCTION CLUSTER LABORATORY


tool room
mechanical area
plumbing—wiring
joining operations
work table
LEARNING RESOURCE CENTER
OFFICE
carpentry
masonry
lumber storage
masonry storage

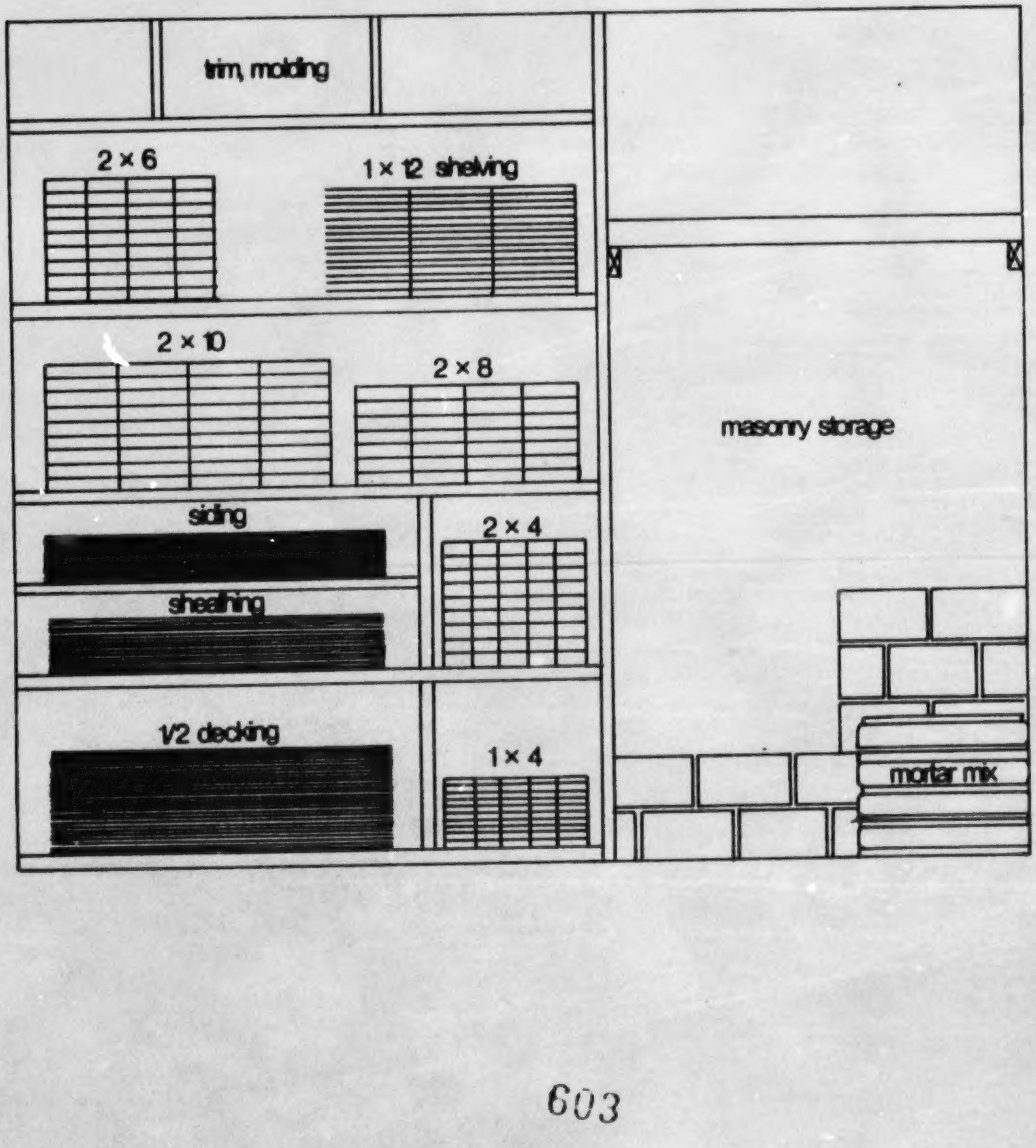
CONSTRUCTION WORKSHOP


9
1
10
4
1
14
2
1
2
2
2
2
12
24
1
17
11
8
7
LEARNING RESOURCE CENTER
1
11
5
1
1
8
1
TOOL ROOM
19
1
1
2
1
6
1
5
13
12
3
22
17
2
20
18
15
16
STORAGE

Construction Woodshop Layout Legend

1	Work Tables
2	Storage Cabinets
3	Wood Lathe
4	Mortice Machine
5	Band Saw
6	Dewalt Saw
7	Dust Collector
8	Jointer
9	Grinder
10	Planer
11	Shaper
12	Tenon Machine
13	Electric Miter Saw
14	Drill Press
15	Nail Bin
16	Air Compressor
17	Sander Disk
18	Block-Belt Sander
19	Tilting Arbor Saw
20	Air Outlets
21	Fire Extinguisher
22	Over-arm Router
23	Tool Board
24	Metal Trash Can

MATERIALS STORAGE


trim, molding
2 × 6
1 × 12 shelving
2 × 10
2 × 8
masonry storage
siding
2 × 4
sheathing
1/2 decking
1 × 4
mortar mix

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Tool Room

1. & 2. Pegboard for most frequently used handtools (hammers, trowels, handsaws, squares, etc.)

3. Pegboard for large handtools (shovels, picks, hoes, etc.)

4. Pegboard for special tools for sharpening, equipment maintenance, and equipment spare parts

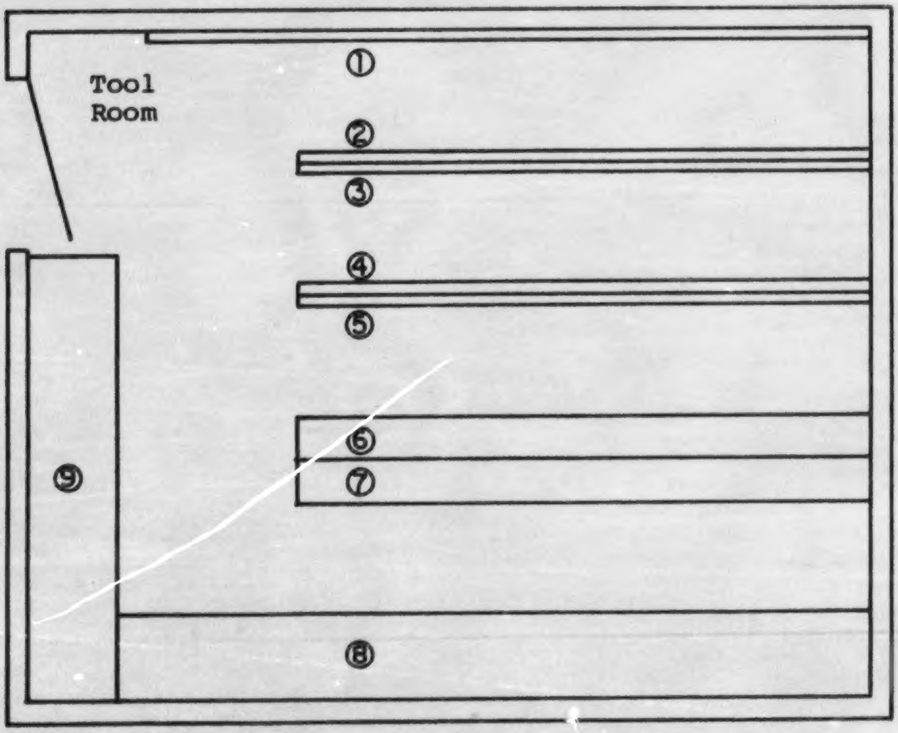
5. Pegboard for additional tools

6. Shelf space for stenciled plywood for portable power tools

7. Shelf space for meters, gauges, testers, etc.

8. Cabinet space (low) can store extra tools. Shelves (high) can store training components which are frequently used.

9. Table top cabinet space for use of tool room attendent for cleaning or repairing tools



SECTION X

DEFINITION OF TERMS

DEFINITION OF TERMS

1. AV's-Audiovisuals - May refer to any picture and/or sound media. (ie. slides, tapes, filmstrips, 16 mm films, etc.)

2. Checkpoint - A student-instructor interface point wherein the instructor may give the student a test, perform a demonstration, or simply provide the student with additional needed information or instructions. Also a checkpoint may be used for motivational purposes.

3. Competency - The ability (knowledge, skills and attitudes) to perform all of a group or cluster of related tasks required to complete a designated activity according to occupational standards. In the educational setting the statement of a competency includes expected student outcomes in terms of knowledge, skills, and attitudes required to complete a designated activity as defined by incumbent workers according to the standards of the work place.

4. Course - A grouping of tasks and competencies which have a common knowledge base or are within a given domain.

5. Criterion-Referenced Measure - An exercise based upon a performance objective, the accomplishment of which measures attainment of that objective.

6. Criterion-Referenced Test - A test designed to measure student competencies based on job or industrial standards.

7. Curriculum Guide - A document containing the objectives, content, organization, and structure of an instructional program. It is designed for use by administrators, instructional supervisors and teachers.

8. D.O.T. - Abbreviation for Dictionary of Occupational Titles. Document provides nine digit codes identifying each occupation.

9. Duty - One of the distinct major activities involved in the work performed, comprising related tasks.

10. Exit Point - A predetermined point within an instructional program in which a student may exit with the essential competencies for a specific job. Usually defined in terms of D.O.T. codes and/or O.E. codes.

11. "Hands-On" - Statement implying the student is physically involved in a learning activity.

12. Individualized Instruction (I.I.) - A system of instruction allowing for a student to progress at their fastest rate.

13. Job - A specific area of specialization within an occupational field consisting of several closely related duties for which a person would expect to receive remuneration. Should be identified by DOT code.

14. Job Sheet - (Or Operations Sheet) - A project of a performance nature. Generally performed by the student in a lab or shop type environment or in a specialized work area.

15. Live Work - Generally refers to items brought into the course area for repair or adjustment. Examples of live work might be automobiles, radios and TV's, air-conditioners, etc. Another form of live work would be patrons visiting the cosmetology department to receive permanents or other services.

16. Master Copies - Original copies of slides, tapes or written materials set aside for the purpose of duplication.

17. Occupational Cluster - A group of occupations sharing a common core of competencies. Georgia's comprehensive high school vocational program is organized around this concept.

18. Occupational Inventory - A listing of tasks to be performed in a particular occupational area, grouped under duty classifications.

19. O.E. - Refers to the U. S. Office of Education. O.E. codes are a classification system (taxonomy) for occupational education programs.

20. Open Entry - Term meaning that a student may enter the program at any time and does not have to wait for quarter or semester breaks.

21. Open Exit - Term meaning that a student may leave a program any time he/she completes their occupational objective.

22. Performance Guide - A series of steps, arranged in a sequence ordinarily followed, which when completed may result in the performance of a task. Also called "teaching steps."

23. Performance Objective - A statement in precise, measurable terms of a particular behavior to be exhibited by a learner under specified conditions. It possesses each of the elements or characteristics specified below:

    a. Condition - The testing situation confronting the learner is clearly specified. This includes equipment provided or withheld, environmental constraints such as temperature, space, etc.

b. Performance - The specific behavior expected of the learner is stated.

c. Standard - The degree of acceptable performance is specified.

24. Performance Test - A test entailing not only the ability to answer questions, but measuring the students' ability to operate, manipulate, or perform a given task as well.

25. Program - An organized sequence of courses leading to an occupational objective. A program may contain one or more student exit points as defined by D.O.T. codes.

26. Program Objective - The outcome of a prescribed program of instruction. Usually expressed in terms of the occupation or job for which training is designed. D.O.T. codes are frequently used to identify program objectives or student exit points.

27. Self-Paced - Refers to a student moving through the prescribed training program at the fastest pace at which the student can meaningfully learn.

28. Sequencing - Putting any set or series of learning activities or tasks into proper order or sequence. Normally arranged from the simple to complex within groupings or blocks.

29. Software - Written or printed materials, slides, filmstrips, tapes, etc.

30. Student Manual - A document designed for use by students in a specific instructional program. It contains unit sheets, references, operational procedures or job sheets, etc.

31. Task - The smallest division of work in which a measurable output occurs. A logical and necessary step in the performance of a duty.

32. Task List - A listing of tasks performed by incumbent workers within a domain of interest. An example is a listing of all tasks performed by an automotive mechanic or by a worker in ornamental horticulture.

33. Unit - One "module" training materials; generally covering one learning task and programmed on one Unit Sheet. May cover more than one lesson.

34. Unit Guide - A curriculum guide sheet that lists a task and objective with the instructional activities, instructional materials, evaluation and approximate time required for a student to successfully complete the task.

35. V-TECS Catalog - A comprehensive collection of performance objectives, performance guides, criterion-referenced measures, and related data, organized by a job structure or career ladder within a domain of interest.

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The following individuals have been designated as the employees responsible for coordinating the department's effort to implement this nondiscriminatory policy.

Title II - Loydia Webber, Vocational Equity Coordinator
Title VI - Peyton Williams Jr., Associate Superintendent
of State Schools and Special Services
Title IX - Evelyn Rowe and Myra Tolbert, Coordinators
Section 504 - Jane Lee, Coordinator of Special Education

Inquiries concerning the application of Title II, Title VI, Title IX or Section 504 to the policies and practices of the department may be addressed to the persons listed above at the Georgia Department of Education, State Office Building, Atlanta 30334; to the Regional Office for Civil Rights, Atlanta 30323; or to the Director, Office for Civil Rights, Education Department, Washington, D.C. 20201.